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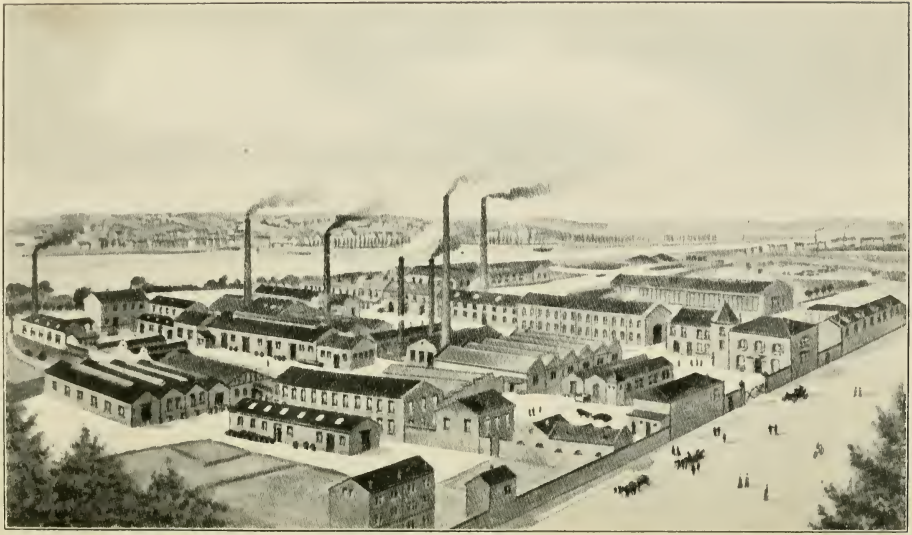

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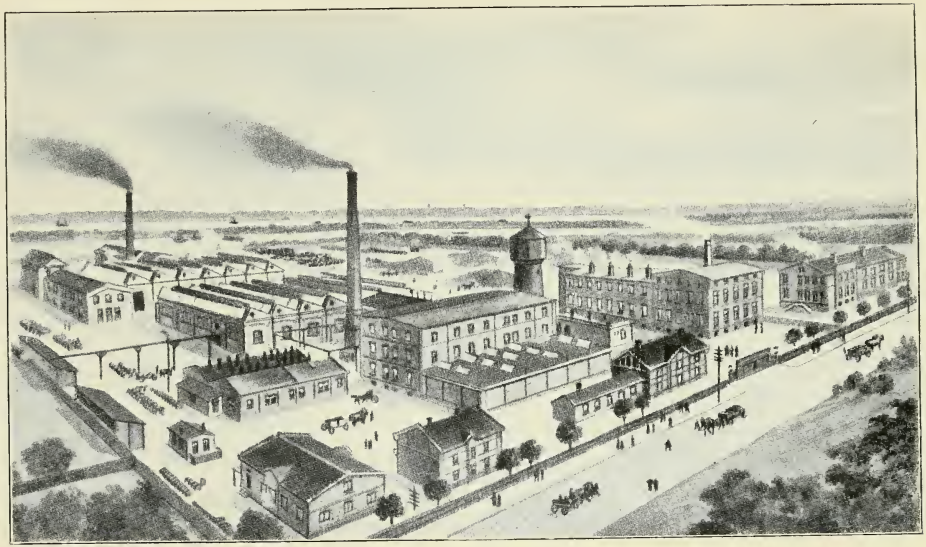

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A MANUAL OF DYEING

WITH THE DYESTUFFS

OF THE

CASSELLA COLOR COMPANY

NEW YORK

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Vol. II.

WOOL. SILK. HALF-WOOL. HALF-SILK.

1908
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PREFACE.

In compliance with a long felt want and frequently expressed desire, we have taken occasion to publish, as a supplement to our exhaustive works on "Cotton Dyeing", "Wool Dyeing" and "Union Dyeing" etc. issued by us during the last few years,

A MANUAL OF DYEING

as a kind of handy book for the dye-house in pocket-book form giving particulars in a concise manner regarding the most important methods of dyeing.

The present Volume II deals with

The Dyeing of Wool, Silk, Half-Wool and Half-Silk.

In addition to the general methods of dyeing and a description of the special methods to be applied for the different classes of goods, we have included in this volume the much appreciated tabulations from our previous books indicating the dyestuffs and combinations thereof best adapted for producing the various shades. Great care has as usual been devoted to combining with comprehensiveness the greatest possible completeness.

We trust that this little volume will prove of equally good service in practice as our other publications have done hitherto.

New York, October 1908.

Cassella Color Company.

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WOOL DYEING.

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6. Dyeing of Military and other Uniform or Livery Cloths.
7. Dyeing of Wool and Fur Felt Hats.

Directions for the Application of the Wool Colours.

Dissolving the Dyestuffs.

The wool dyestuffs are best dissolved by pouring plain boiling water over them. It is an advantage to use either condensed water or other water free from lime for this purpose, because some of the dyestuffs precipitate with lime.

It is best to strain the dyestuff solution through a piece of cotton cloth or a fine sieve when adding it to the dye-bath. Any undissolved particles are then brought into solution by rinsing with hot water.

When dissolving Basic Colours, calcareous water should be corrected by adding a little acetic acid. Basic Colours which are more difficult to dissolve are best stirred first to a paste with a little acetic acid and after standing for some hours dissolved by pouring hot water on them.

Acid Colours.

(Easily Levelling Colours.)

Naphtol Yellow S, SL

China Yellow B

Acid Yellow AT

Indian Yellow G, FF, R

Metanil Yellow

Fast Yellow S

Tropaeoline O, OO, G

Orange GG, extra, II, IV, R

Orange GG crystals

Azo Orseille BB

Lanafuchsine SG, SB, 6B

Acid Magenta

Archil Substitute N powder and paste, I extra paste

Azo Wool Violet 7R, 4B

Acid Violet 6BS, 6BC, 4RS

Cyanole FF, extra, extra H, AB, BSB, C, V

Tetra Cyanole V, SF, extra, [A

Indigo Blue N, SGN

Thiocarmine R paste and powder

Azo Wool Blue SER, SE, C, B

Azo Navy Blue B, 3B

Acid Navy Blue A

Brilliant Naphtol Blue R, B, 4B

Cyanole Green B, 6G, S

Cyanole Fast Green G

Acid Green extra conc., extra conc. B, 5G, H, liquid 40%, liquid conc.

Fast Acid Green BN, B

Azo Merino Black 8B, 6B, 6BE, B, BE.

Method I.

Charge the dyebath with

10% Glauber's salt crystals,
5—10% bisulphate of soda (according to depth of shade required), and the dyestuff,

or with

20% Glauber's salt crystals
2—4% sulphuric acid, and the dyestuff;

enter the goods hot or even at the boil, and boil for 1 to 1¼ hour. In the case of deep shades and Blacks, a little bisulphate of soda or sulphuric acid may be added subsequently in order to effect a better exhaustion of the bath; a complete exhaustion is particularly of importance for piece-goods with vegetable fibre effects.

Goods hard to penetrate are entered at rather a lower temperature, the bath being then raised gradually to the boil; it is recommended also to somewhat increase the quantity of Glauber's salt.

In the case of non-neutralised, carbonised, goods the dyeing is commenced with Glauber's salt only, a little bisulphate of soda or acid being added later on if necessary.

The dyestuffs enumerated may be used straight-away for shading purposes in a boiling bath; only in the case of very pale compound shades is it necessary to be more particular about selecting the most suitable dyestuff, for which purpose the following, which level particularly well, come first into consideration:

Fast Yellow S — **Tetra Cyanole** V
Acid Yellow AT — **Cyanole Green** B, 6G
Orange GG — **Cyanole Fast Green** G
Azo Orseille BB.

The old baths are to advantage used over again, experience showing that the Acid Colours level still more easily in old baths than in a fresh liquor.

The quantities of Glauber's salt and bisulphate of soda or acid required for the standing baths amount to about one-quarter of the original weights of Glauber's salt and about one-half of that of bisulphate of soda or acid.

Acid Colours.

Orange EN, ENZ
Acid Brown, D
Brilliant Scarlet G, GG, R, 2R, 3R, 4R, 6R
Crystal Scarlet 6R
Scarlet FR, F2R, F3R, EC
Brilliant Cochineal 2R, 4R
Brilliant Croceïne R, ROO, B, BOO, M, MOO, 2B, 3B, 5B, 6B, 7B, 9B
Croceïne AZ
Roccelline
Azo Rubine A
Naphtol Red C, EB
Amaranth
Azo Red A
Bordeaux BL
Peri Wool Blue B, BG, G
Water Blue B, RB, R, No. 225
Wool Blue TB
Navy Blue RSC
Solid Blue 6G, R, 3R
Induline B, 2B, 3B
Silver Grey N
Aniline Grey B, R
Nigrosine soluble in water
Naphtol Green B
Naphtol Dark Green G
Naphtylamine Black ESN, ESS, ES3B, ES5B, ES8B, EFF, S, 7B, 7BS, 6BS, 4BS, SS2B, SS3B, SGG, SOO, SOT, T, TJ, TN
Naphtylamine Blue Black 5B, B, BD
Naphtol Blue Black
Naphtol Blue Black SB, S2B, S3B, 6B
Naphtol Black B, 2B, 3B, 6B, M, SG, P, 4R

Method II.

The method of dyeing is on the whole the same as for the easily levelling colours mentioned on page 4 (Method I), but it is best to commence dyeing with only half the stated amount of bisulphate of soda or acid, and to add the remainder in several portions after boiling for $^1/_2$ hour.

The dyeing is also frequently effected — particularly in the case of piece-goods — by adding the whole amount of acid together with 20—25 % Glauber's salt straightaway to the bath, entering the goods at from 50—55° C. (120—130 deg. F.), and raising to the boil in the course of $^3/_4$ hour.

For *Peri Wool Blue*, charge the bath with

25—30 % Glauber's salt crystals and
15 % bisulphate of soda or
5— 6 % sulphuric acid

and the dyestuff; enter the goods handwarm, raise to the boil in the course of about an hour, and boil as hard as possible for $1^1/_4$ to $1^1/_2$ hours.

For *Black*, charge the bath with

10 % Glauber's salt crystals,
10 % bisulphate of soda and the dyestuff,
or with
20 % Glauber's salt crystals,
4 % sulphuric acid and the dyestuff.

Enter at about 60—70° C. (140—160 deg. F.), raise in the course of about 20 minutes to boiling temperature, and after an hour's boiling, exhaust, if necessary, by adding a little bisulphate of soda or some acid.

When shading with the above-named Acid Colours, it is necessary to cool the bath off before adding them and then to bring again gradually to the boil.

For subsequent shading, the easily levelling colours indicated for Method I on page 4 may to advantage be added straight to the boiling liquor.

Acid Colours.

Milling Yellow O, OO
Naphtaline Yellow crystals
Milling Red G, FGG, FR, R
Wool Red B, BG
Rosazeïne B, 13
Formyl Violet S4B, S5B, 6B, 8B, 10B
Alkaline Violet CA, C
Formyl Blue B
Brilliant Milling Blue B
Brilliant Milling Green B
Lanacyl Blue BB, R
Lanacyl Navy Blue B, BB, 3B
Lanacyl Violet B
Azo Merino Blue 3B, G
Azo Merino Dark Blue R
Naphtol Blue G, R
Naphtylamine Black 4B, 4BN, 6B, X2B, X3B, OO, D, BBN, BBT, BBV, 3BV
Alphanol Black BG, R
Anthracite Black B, R.

Combinations of

Naphtol Black 3B, 6B
Naphtylamine Blue Black 5B
Naphtylamine Black ES8B, ES5B, ES3B, ESN, S, 7BS

chiefly on piece-goods for Navies and Dark Blues

with

Formyl Violet S4B, S5B, 6B, 8B, 10B
Brilliant Milling Blue B

Method III.

Charge the bath with

10—20% Glauber's salt crystals
2— 5% acetic acid and the dyestuff;

enter the goods at 40° C. (105 deg. F.), raise to the boil in 20 to 40 minutes, and exhaust the bath after 1/2 to 3/4 hour's boiling by gradually adding 3—5% acetic acid, or in the case of deep shades 3—7% bisulphate of soda, or 1—3% sulphuric acid.

For piece-goods hard to penetrate, the amount of Glauber's salt is increased and the goods are entered at a somewhat lower temperature.

In the case of goods containing kempy wools or other kinds which are difficult to dye through, the bath is kept at a lively boil; it is helpful in covering kempy wools to add a little acid subsequently to the dyebath.

Rosazeïne, *Formyl Violet* and *Brilliant Milling Green B* (the two latter particularly in deep shades) are frequently also dyed with bisulphate of soda or sulphuric acid according to Methods I or II, especially on piece-goods.

Lanacyl Blue and *Lanacyl Violet* are to advantage dyed straightaway with the addition of the whole of the requisite acid (acetic acid). Charge the bath with

20% Glauber's salt crystals,
10% acetic acid and the dyestuff;

enter handwarm, raise to the boil in the course of 3/4 to 1 hour, and boil for about an hour until the bath is exhausted.

In the case of *Naphtylamine Black* the dyeing is usually commenced at 70° C. (160 deg. F.) The dyeing may also be commenced with bisulphate of soda or sulphuric acid, but the Black turns out a little less bloomy by this method than by the one indicated above. Commence dyeing with the addition of

10% Glauber's salt and
5% bisulphate of soda or
2% sulphuric acid,

adding after 3/4 hour's boiling about the same quantity of bisulphate of soda or sulphuric acid in order to exhaust the bath.

For the *subsequent shading* it is best to use the *easily levelling dyestuffs* indicated under Method I on page 4 which may be added straight to the boiling bath. If however the shading is done with the dyestuffs named on page 6, the bath has to be cooled off first and is brought again gradually to the boil after adding the dyestuffs.

Acid Colours.

Naphtyl Blue Black N
" " " NV
" " " FB
" " " FBB
Naphtylamine Black R
" " RNB
" " NBB

Method IV.

Charge the bath with

1—2 % oxalic acid (according to the hardness of the water),
5 % acetic acid (for Dark Blue 2—3 % acetic acid),
20 % Glauber's salt cryst. and the dyestuff.

Enter the goods at 60—70° C. (140—160 deg. F), raise in 20 to 30 minutes to the boil, and after about an hour's boiling add, if necessary, a little acetic acid in order to exhaust the bath. Then add

3 % sulphate of copper,

and work for another ½ hour without boiling. In the case of goods difficult to penetrate, enter at a lower temperature and raise gradually to the boil.

The dyestuffs may likewise be dyed without the addition of sulphate of copper, but the resulting dyeings will only be moderately fast to steaming. In the case of *Naphtylamine Black FB* and *FBB* the addition of oxalic acid may be omitted.

Several lots may be dyed consecutively in the same liquor by cooling it off to some extent and adding

¼—½ % oxalic acid,
3 % acetic acid (for Dark Blue 1—2 %),
7 % Glauber's salt cryst. and the dyestuff,

then boiling for about an hour, and exhausting, if necessary, by the addition of a little acetic acid, adding

2½ % sulphate of copper,

and running for another ½ hour without steam.

For shading, the following dyestuffs are used:

For Blue-black: Formyl Violet, all brands; Cyanole extra; Tetra Cyanole A; Brilliant Milling Blue B; Lanacyl Blue BB, R

For Jet Black: Anthracene Yellow C; Acid Yellow AT; Brilliant Milling Green B.

Regarding the application of *Naphtyl Blue Black and Naphtylamine Black in combination with Sumac Extract* see page 85.

Alphanol Blue, Alkaline Blue, Eosines.

Method V.

Alphanol Blue, all brands

Charge the bath with

10 % Glauber's salt,

5 % acetate of ammonia * and the dyestuff; enter the well scoured material at about 40° C. (105 deg. F.), raise in 1/2 hour to the boil, and dye boiling for one hour, subsequently adding a little acetic acid if necessary.

It has to be observed that the bath should not be alkaline but slightly acid.

When dyeing wool which is still slightly alkaline, it is recommended to add to the dyebath on starting 1/4—1/2 % bichromate of potash in addition to 1—2 % acetic acid.

According to this method, Milling Yellow O, Milling Red, Wool Red, Formyl Violet, Brilliant Milling Blue B, Formyl Blue B, Brilliant Milling Green B, Anthracite Black and Alphanol Black may likewise be applied.

Method VI.

Alkaline Blue 6 B
" " 5 B
" " 4 B
" " 3 B
" " 2 B
" " B
" " R
" " 2 R
" " 3 R
Alkaline Violet CA
" " C

Charge the dyebath with

1—2 % soda ash or

3—6 % borax and the dyestuff;

enter the goods at about 60° C. (140 deg. F.), raise in about 20 minutes to abt. 90° C. (195 deg. F.), and work at this temperature for 1/2 to 3/4 hour, according to the depth of shade to be dyed. Then rinse, develop in a fresh bath of 60—70° C (140—160 deg. F.) with

4—5 % sulphuric acid

for 1/4 hour, and rinse again thoroughly.

Copper vessels should be avoided as much as possible in the dyeing, as the shades do not turn out so clear when using vessels of this kind.

The baths used for full shades do not exhaust entirely, and are used to advantage for subsequent lots.

Carbonised goods (shoddy etc.) should be completely neutralised previous to dyeing.

Method VII.

Eosine 3 G, GGF, L, BN
Eosine Scarlet B
Erythrosine yellow shade, D, extra N, B
Phloxine S
Rose Bengale extra N

For the *Eosine* Colours, which are usually dyed according to Method III, page 6, the following method which yields particularly brilliant shades is frequently applied:

Prepare the bath with

5 % acetic acid, 5 % alum and 3 % tartar; enter the goods, boil for 1/2 hour, then cool off to about 50° C. (120 deg. F.), add the dyestuff in solution, raise gradually to the boil, and boil for another 1/4 hour. If the bath is not completely exhausted, add a little more acetic acid.

---

* Acetate of ammonia is prepared by mixing 10 oz ammonia (0,913 sp. g. or 24 %) and 26 1/4 oz acetic acid (8° Tw. or 30 %),

The solution should be neutral and not change blue or red litmus paper to any extent.

Acid Chrome Colours.

Anthracene Chrome Blue G, BB, F, B, R

Azo Chrome Blue T, TB

Anthracene Chrome Brown D, DW, A, SWN

Anthracene Chrome Red A

Anthracene Chrome Violet B

Anthracene Acid Brown G

Anthracene Yellow BN

Anthracene Acid Black SR, SRT, SRG, SBB, SA, SAS, SASN, SASG

Naphtylamine Black Cr, CrN.

Method III.

Charge the dyebath with

10 % Glauber's salt crystals,
1—4 % sulphuric acid (according to the depth of shade required) and the dyestuff;

enter the goods at 50—60° C. (120—140 deg. F.), raise in about ½ hour to the boil, and boil for 1 hour, then cool off a little, add the requisite amount of bichrome, and boil for about another ¾ hour. For Black, the goods may be entered at a somewhat higher temperature and the bath be raised more quickly to the boil. In the case of *Azo Chrome Blue*, 1 % sulphuric acid is added in addition to the bichromate of potash, the blue being developed by one hour's boiling.

For *Colours*, it is usual to add about two-thirds of the weight of bichrome as of dyestuff; for *Anthracene Acid Black*, one-half, and for *Naphtylamine Black CR* and *CrN* one-third, the weight of bichromate of potash as of dyestuff is sufficient.

As a rule, the same quantity of sulphuric acid as of dyestuff is used, but not less than 1 % and no more than 4 %, or for Blacks 5 %; for *Anthracene Chrome Brown D*, *A* and *SWN*, however, not any more than 3 % sulphuric acid should be used.

When dyeing *Anthracene Chrome Violet B*, *Anthracene Chrome Blue* (all brands), *Anthracene Acid Black SR*, *SRT*, *SRG*, *SA*, *SBB*, *Naphtylamine Black Cr* and *CrN* in copper vessels or apparatus, the dyebath at a temperature of 50° C. (120 deg. F.) is charged first with ½ % sulphocyanide of ammonia (of the weight of the wool), stirred well, and left standing for 20 minutes before adding the Glauber's salt, acid and dyestuff.

For particulars of subsequently shading the dyeings see page 12.

Acid Chrome Colours.

Anthracene Yellow C
powder and Paste, R, GG
Anthracene Chrome Brown DWN
Anthracene Acid Brown
R, N, B, V, SW
Anthracene Chrome Blue
FR, FD
Anthracene Acid Blue
BBN, BB, 3B, RT
Anthracene Blue Black C

Anthracene Chrome Black
F
,, FF
,, FR
,, 5B
,, P extra
,, PPN extra
,, PF extra
,, PFB extra
,, PFBB extra
,, PFR extra
,, PR extra

Anthracene Acid Black
ST
,, DSN
,, DSF
,, DSFB
,, DNG
,, DSST
,, SW
,, LW.

In addition to these, the dyestuffs mentioned under Method VIII may likewise be applied according to this method.

Method IX.

Charge the bath with
10 % Glauber's salt crystals,
1—5 % acetic acid and the dyestuff;
enter the goods at 40—50° C. (105—120 deg. F.), raise in 1/2 hour to the boil, and after 1/2 hour's boiling exhaust by gradually adding
5— 8 % acetic acid or
3—10 % bisulphate of soda or 1—4 % sulphuric acid;
then cool off a little, add the requisite quantity of bichrome, and boil for another 1/2 to 3/4 hour. For *Anthracene Chrome Black* and *Anthracene Acid Black*, enter the goods at about 70° C. (160 deg. F.), and raise immediately to the boil.

The requisite quantities of bichromate of potash are for *Anthracene Chrome Blue FR*, *Anthracene Acid Blue* and *Anthracene Chrome Brown DWN* about two-thirds, for *Anthracene Blue Black C*, *Anthracene Yellow* and *Anthracene Acid Brown* one-half, and for *Anthracene Chrome Black* and *Anthracene Acid Black* about one-third, of the weights of dyestuff used.

Anthracene Yellow GG is to advantage after-treated with chromium fluoride, an equal quantity as of dyestuff being used, not exceeding however 3 1/2 %.

In the case of *Anthracene Chrome Black 5 B* as well as of the "*P*" *brands*, and of the "*D*" *brands* of the *Anthracene Acid Black* series excepting *DSST*, formic acid may be used instead of acetic or sulphuric acid, the dyeing being commenced with the addition of 0,5 % formic acid 85 % and the bath exhausted by adding further 2—3 1/2 % of this acid.

If calcareous water is used, the bath should in the case of *Anthracene Chrome Black F*, *FE*, *FR* and *Anthracene Acid Black DSST*, *SW*, *LW* be corrected first with 2 % oxalate of ammonia* before adding the dyestuff or acid.

Wen dyeing with *Anthracene Chrome Blue FR*, *Anthracene Acid Blue* (all brands), *Anthracene Chrome Black P extra* and *PR extra* in copper vessels or machines, 1/8 % sulphocyanide of ammonia is first added to the bath according to Method VIII, page 9.

For particulars of subsequently shading the dyeings see page 12.

* Oxalate of ammonia is sold in a technically pure form, but may also be easily prepared in the following manner:
Dissolve per 100 gallons dye liquor
3—9 oz oxalic acid in
1—3 quarts hot water
and neutralize this solution by the addition of about 3 1/4—10 oz ammonia 0,912 sp. grav.

Dyestuffs on Chromed Wool.

Anthracene Chrome Blue BW extra, RRW extra

Anthracene Acid Blue RR and GG

are dyed *exclusively* on chromed wool according to Method X.

In addition to these, the following dyestuffs may also be dyed according to this method:

Anthracene Chrome Blue G, BB, F, B, R, FR, FD

Anthracene Acid Blue BBN, BB, 3B

Anthracene Blue Black C

Anthracene Yellow BN, C powder and paste, R, GG

Anthracene Acid Brown G, R, N, B

Anthracene Chrome Brown D, DWN, DW, A, SWN

Anthracene ChromeRed A

Anthracene ChromeViolet B

Anthracene Acid Black DSN, DSF.

Method X.

Mordant the wool, according to the desired depth of shade, with

$1^1/_2$—**4** % bichrome and
$1^1/_2$—3 % tartar

for $1^1/_2$ hours at the boil, then rinse, and dye in a fresh bath with the addition of

1—3 % acetic acid or
5 % acetate of ammonia* (for very pale shades).

Enter the goods at 40—50° C. (105—120 deg. F.), raise in $^1/_2$ hour to the boil, and boil for $1^1/_2$ to 2 hours, adding a little acetic or formic acid if necessary after boiling for an hour, in order to exhaust the baths.

For dark shades it is recommended, in order to ensure best possible fastness to milling and alkalies, to chrome subsequently with

$^1/_2$—$^3/_4$ % bichromate of potash

for 20—30 minutes at the boil in the exhausted dyebath.

As an assistant for the mordanting, formic or lactic acid, or lactoline, may be used in proportionate quantities in the place of tartar.

Carbonised goods have to be neutralised previous to mordanting, the results obtained with a bichrome-sulphuric acid mordant being less satisfactory.

With regard to dyeing in copper vessels and subsequent shading of the dyeings see Method VIII and page 12 respectively.

Anthracene Chrome Blue BW extra and *RRW extra* are dissolved by mixing the dyestuff with a little ammonia (abt. 7 oz ammonia per 1 lb dyestuff) and adding hot water. *Anthracene Acid Blue RR* is dissolved in water of 50—60° C. (120—140 deg. F.)

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* Regarding the preparation of acetate of ammonia, see foot-note on page 8.

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Dyestuffs dyed direct with the addition of Bichrome.

Anthracene Chromate Brown EB, 3G
Anthracene Chromate Green B
Anthracene Yellow BN
Anthracene Yellow C powder and paste
Alphanol Blue B extra
Anthracene Blue Black C (dyed in pale shades)
Diamine Fast Red F
Wool Red B
Formyl Violet S4B, 10B
Formyl Blue B
Brilliant Milling Green B
Brilliant Milling Blue B
Anthracite Black R

as shading products for the above-named Anthracene Colours.

Method XI.

Charge the dyebath with the requisite quantities of dyestuff and of bichrome (about one-half to two-thirds of that of dyestuff) and in addition thereto with 10 % Glauber's salt cryst. in the case of piece-goods.

The dyestuff and bichrome should be dissolved both independently and be added separately to the liquor.

Enter at 70—80° C. (160—175 deg. F.), raise in 1/4 hour to boiling temperature, add 2—3 % acetic acid after about 3/4 hours boiling, and boil for another 3/4 to 1 1/4 hour.

Regarding subsequent shading of the dyeings see below.

For shading dyeings produced with Chrome Colours which have been already chromed

the same Chrome Colours as have been used for the dyeing are usually employed, especially in the case of loose material; the dyebath is first cooled off a little, the well dissolved and diluted dyestuff is added and the bath brought again gradually to the boil, the boiling being maintained for 20 to 30 minutes. If fairly large quantities of Anthracene Colours are used for the subsequent shading, that is to say, more than one-quarter of those used originally, they should in order to ensure best possible fastness to milling be fixed with a little bichrome; if only small quantities are used, the subsequent after-chroming may be omitted.

The chromed dyeings may also be shaded subsequently with Acid Colours possessing good fastness to milling, of which the following may be mentioned:

Brilliant Milling Green B
Formyl Blue B
Brilliant Milling Blue B
Tetra Cyanole A
Formyl Violet, all brands
Milling Yellow O
Wool Red B.

When shading it is recommended to cool off the bath to some extent before adding the well dissolved dyestuff.

For yarns, and particularly also for piece-goods, easily levelling dyestuffs are frequently also used and may be added straight to the boiling liquor; of these the following are the best suited:

Tetra Cyanole V
Cyanole extra, FF
Cyanole Fast Green G
Cyanole Green B, 6G
Acid Yellow AT
Orange GG
Azo Orseille BB
Acid Violet 6BC

Diamine Colours.

Thioflavine S
Oxy Diamine Yellow TZ
Diamine Fast Yellow FF
Diamine Yellow CP
Diamine Gold
Diamine Orange B, F
Oxy Diamine Orange G, R
Diamine Brown, 3G, R, M, B
Diamine Catechine G
Oxy Diamine Brown G
Diamine Fast Red F
Diamine Scarlet B, 3B
Diamine Brilliant Scarlet S
Diamine Red 4B, 6B, 10B
Diamine Purpurine B, 3B, 6B
Diamine Rose GD, BG, BD, B extra
Direct Rose T
Diamine Bordeaux B, S
Diamine Brilliant Bordeaux R
Diamine Violet N
Oxy Diamine Violet B, G, R
Diamine Sky Blue FF
Diamine Blue RW, 3B, 2B, BX
Diamine Steel Blue L
Diamine Green G, B, CL
Diamine Dark Green N
Diamine Black HW
Diaminogene extra
Diamine Jet Black OO

Method XII.

Charge the bath with

10—20 % Glauber's salt crystals (according to the depth of shade or
10—20 % Glauber's salt crystals and
5 % acetate of ammonia *, and the dyestuff;

enter the goods at abt. 60° C. (140 deg. F.), raise in 20 to 30 minutes to the boil, and boil for ¾ to 1 hour. Then sample, and if necessary shade with the same dyestuffs in a boiling bath.

The baths can if required be exhausted completely by adding gradually

2—5 % acetic acid,

which is however usually employed only for self shades and for Colours which are to be aftertreated with metallic salts, for instance, for Diamine Fast Red.

The aftertreatment with bichrome, chromium fluoride or sulphate of copper is carried out either in the *exhausted* bath, or in a fresh bath with the addition of

3—4 % acetic acid

for about ½ hour at a gentle boil.

Of bichrome, about one-half the quantity is used as of dyestuff, and of chromium fluoride or sulphate of copper about an equal weight as of dyestuff.

* For the preparation of acetate of ammonia see foot-note on page 8.

Basic Colours.

Diamond Magenta Ia
Magenta yellow shade
Cerise Ia
Russian Red B, G
Aniline Brown
Irisamine G
Methyl Violet 6B—4R
Crystal Violet 5B bluish, 10B
Victoria Blue B
New Methylene Blue N, NSS
Solid Green cryst. O
Malachite Green conc.
Brilliant Green cryst extra
Thioflavine T, TCN
Chrysoïdine AG, Crystals R
Bismarck Brown FFG, GG, EE.

Method XIII.

Charge the bath with

2—3 % acetic acid and the dyestuff;

enter the goods at 50° C. (120 deg. F.), raise the temperature to 80° C. (175 deg. F.) in the course of about ½ hour, and dye for another 15 or 20 minutes at this temperature.

Dyeings that have turned out too dark may easily be stripped a little by adding some acetic acid to the dyebath and heating if necessary almost to boiling temperature.

Irisamine can also be dyed like *Rosazeïne* according to Method III, page 6.

For *Green*, the following method is frequently also applied and yields fuller shades:

For 100 lbs of wool, dissolve

20 lbs hyposulphite of soda crystals and

10 lbs alum

in the dyebath, adding

4 lbs sulphuric acid of 168° Tw.

when these salts are quite dissolved. Enter the yarn at 40° C. (105 deg. F.) into the bath which has a milky appearance, heat gradually to 80° C. (175 deg. F.), work for an hour, rinse thoroughly in water, and add to the last rinsing bath ½ gallon ammonia per 100 gallons. Then dye as indicated above in an acetic acid bath at a temperature of 80—90° C. (175—195 deg. F.)

Dyeing of Loose Wool.

The Dyeing of Loose Wool.

Washing. In order to ensure good and level results in dyeing, the wool must first be thoroughly freed from any adhering impurities, such as suint, grease, etc The wool is to this end soaked in wool washing or scouring machines (leviathans), or in troughs, which are charged according to the amount of the impurities of the wool with a liquor containing varying quantities of soda (on an average 10 % soda crystals calculated on the weight of the wool) or soda and some soap or ammonia, care being taken that the temperature of the bath does not exceed 40—50° C (105—120 deg F.). The wool is worked gently in this liquor for 20 to 30 minutes, squeezed off well by means of the squeezing rollers, and rinsed in a wool washing machine or in another washing machine with a plentiful supply of fresh water until the rinsing water runs off perfectly clear.

Carbonising. In order to remove any vegetable impurities such for instance as burls, straw, particles of wood, grass, etc., the scoured wool is carbonised or extracted.

The well scoured wool is worked for 1 to 2 hours in wooden, stone or cement vats containing a sulphuric acid solution twaddling 4—7 degrees, then thoroughly whizzed in hydro-extractors lined with lead or provided with a solid coating of enamel, and brought into the so-called carbonising stove. In this stove the wool is first dried at 50—60° (120—140 deg. F.), and then extracted at 90—105° C (195—225 deg. F.). After carbonising, it is washed, or neutralised with a soda solution of 3—7 deg. Tw., and then rinsed well. A thorough rinsing or neutralising is most essential to ensure good results in dyeing, because the large amount of acid contained in the carbonised wool would cause the dyestuffs to rush on to the fibre too rapidly, unlevel dyeings being the result.

Bleaching. Yellow wools must in certain instances be bleached in order to obtain a pure white. Loose wool is mostly bleached with bisulphite.

Enter the well scoured and wetted out wool into a cold bath charged per 1000 gallons liquor with 20—25 gallons bisulphite of 64—77 deg Tw. and 1—2 gallons concentrated sulphuric acid, leave immersed therein for several hours while working a little from time to time, then throw out, and allow to drain well. Then sour off in a cold bath containing $^1/_2$—1 gallon concentrated sulphuric acid per 1000 gallons liquor, wash, and dry at not too high a temperature. The bleaching is best done in wooden, stone, or cement vats; metal vats should be avoided in order to exclude the risk of the wool turning out patchy.

In order to improve the clearness and purity of the white and to produce the so-called porcelain-white, traces of any of the following dyestuffs in solution are added to the bisulphite bath or to the last rinsing bath:

Formyl Violet S4B—10B
Methyl Violet B—6B
New Methylene Blue GG, N

according to the shade desired, particular care being taken that the wool is worked very thoroughly.

Solid bisulphite may also be used in the place of the bisulphite solution of 64—77 deg. Tw., one-third to one-half of the afore-mentioned quantities being required when using the solid form.

Sulphurous acid, which is marketed in a liquid or gaseous form, may likewise be used for this purpose with advantage.

Dyeing. Loose wool may be dyed in open vessels or in dyeing machines.

When using open vats, the normal volume of water should be 30 to 40 times, when dyeing in machines only 10 to 20 times, the weight of the wool.

For the production of dyeings very fast to milling, the *Anthracene Colours* are in the first place used, and some Acid Colours which are especially fast to milling such as *Milling Yellow*, *Milling Red*, *Wool Red*, *Formyl Violet*, *Formyl Blue*, *Brilliant Milling Blue*, *Tetra Cyanole A*, *Brilliant Milling Green* and *Anthracite Black*. Numerous Diamine Colours are also entirely fast to milling next to wool; and some of this group, as for instance *Diamine Fast Red F*, *Diamine Green G*, *Diamine Brown M* and *B* may by an aftertreatment with metallic salts be fixed so completely as to withstand a severe milling even next to cotton.

Loose wool is dyed exactly according to the instructions given on pages 4 to 14.

If dyestuff, acid or bichrome of potash are to be added subsequently to the dyebath, such additions are made by sprinkling the diluted solutions of these ingredients over the wool; before doing so, however, the dyebaths should be cooled off to some extent, especially when dyeing pale and medium shades.

When dyeing in machines, it is essential to use as soft water as possible, condensed water to best advantage.

Dyestuffs which are sensitive to copper are dyed in copper vessels, if necessary with the addition of about $^1/_2\,\%$ sulphocyanide of ammonia calculated on the weight of the wool. When working continuously the copper becomes covered with a thin coating which weakens the action of the copper on the dyestuffs to a certain extent and should therefore not be removed unnecessarily.

For light milling

Combinations of

Acid Yellow AT
Tropaeoline O
Orange GG
Lanafuchsine 6 B
Cyanole Fast Green

→ Method I, page 4.

Of better fastness to milling:

Combinations of

Milling Yellow O, OO
Wool Red B, BG
Cyanole Fast Green G

→ Method III, page 6.

or,

combinations of

Diamine Yellow CP
Diamine Brown 3 G, R, M, B
Oxy Diamine Brown G
Diamine Catechine G
Diamine Scarlet B, 3 B
Diaminogene extra

→ Method XII, page 13.

The following dyestuffs of the above combinations yield dyeings very fast to light:

Acid Yellow AT
Milling Yellow O, OO
Tropaeoline O
Orange GG
Lanafuchsine 6 B
Wool Red B
Cyanole Fast Green G
Diamine Yellow CP
Diamine Scarlet B, 3 B
Diaminogene extra.

For heavier milling

a) Of good fastness to milling next to wool and cotton:

Combinations of

Milling Yellow O, OO
Milling Red G
Wool Red BG
Brilliant Milling Green B
Formyl Violet S 4 B

→ Method III, page 6

For Greys:

Anthracite Black B
Anthracite Black R

→ Method III, page 6

b) Of good fastness to milling next to wool:

Combinations of

Diamine Fast Yellow FF
Diamine Brown M, B
Diamine Catechine G
Diamine Fast Red F
Diaminogene extra
Oxy Diamine Violet B

→ Method XII, page 13, if necessary aftertreated with chrome.

The following dyestuffs of the above combinations yield dyeings very fast to light:

Milling Yellow O
Diamine Fast Yellow FF
Diamine Fast Red F
Diaminogene extra
Oxy Diamine Violet B.

Shades and Browns on Loose Wool.

Excellently fast to milling and light

Combinations of

- Anthracene Yellow BN
- Anthracene Acid Brown G
- Anthracene Chrome Brown D, DW, SWN
- Anthracene Blue Black C
- Anthracene Chrome Red A
- Anthracene Chrome Blue G, BB, F, R
- Anthracene Chrome Violet B

Method VIII, page 9.

For brown shades especially combinations of

- Anthracene Chrome Brown [DWN
- Anthracene Acid Brown G, N, B, V
- Anthracene Yellow BN, C
- Anthracene Chrome Red A
- Anthracene Blue Black C
- Anthracene Chrome Blue G, BB, R
- Anthracene Chrome Violet B
- Anthracene Bhrome Black F, P extra, PFB extra

Method IX, page 10.

or

- Anthracene Chromate Brown EB, 3G
- Anthracene Yellow BN, C
- Alphanol Blue BR extra
- Anthracene Blue Black C
- Wool Red B

Method XI, page 12.

For pearl shades:

Anthracene Chrome Blue G, BB
Anthracene Blue Black C
dyed with the addition
1—2% chromium fluoride
2—3% acetic acid or
2—4% chrome alum
2—3% acetic acid
for 3/4—1 hour at the boil.

Special properties of fastness

Dyestuffs fast to steaming:

All the colours named are excellently fast to steaming, with the exception of

- Alphanol Blue BR extra
- Anthracite Black B, R
- Diamine Brown R
- Oxy Diamine Brown G
- Diamine Catechine G
- Diaminogene extra

the shades of which are slightly changed by severe steaming.

Dyestuffs fast to carbonising:

All the colours named with the exception of

- Lanafuchsine 6B
- Oxy Diamine Brown G

Dyeings of Diamine Brown R should be thoroughly neutralised after carbonising.

Dyestuffs fast to stoving:

All the colours named with the exception of

- Wool Red B, BG
- Alphanol Blue BR extra
- Diamine Scarlet B
- Diamine Brown R
- Oxy Diamine Brown G
- Diaminogene extra
- Anthracene Yellow BN
- Anthracene Acid Brown G
- Anthracene Chromate Brown 3G

The following are fairly fast to stoving and satisfactory for most purposes:

- Milling Red G
- Diamine Scarlet 3B
- Diamine Brown 3G
- Diamine Catechine G
- Anthracene Yellow C
- Anthracene Chrome Brown SWN, DWN
- Anthracene Chromate Brown EB.

For light milling

Yellow:

*Tropaeline O, *Acid Yellow AT — Method I, page 4

or

Thioflavine S, *Diamine Fast Yellow FF, *Diamine Yellow CP, *Diamine Gold — Method XII, page 13.

Orange:

*Orange GG, Method I, page 4

or

Oxy Diamine Orange G, Oxy Diamine Orange R, Diamine Orange B — Method XII, page 13.

For very bright shades of Orange:

Combinations of

*Acid Yellow AT, Rosazeïne B, 13 — Method I, page 4.

Pink:

Diamond Magenta Ia, Magenta yellow shade — Method XIII, page 14.

or as stated in the next colum for heavier milling.

For heavier milling

Yellow and Orange:

a) Of good fastness to milling next to wool and cotton:

*Milling Yellow O, OO combined if necessary with Milling Red G, Rosazeïne B, 13 — Method III, page 6

b) Of good fastness to milling next to wool:

Thioflavine S, *Diamine Fast Yellow FF, *Diamine Yellow CP, *Diamine Gold, Diamine Orange F, B, Oxy Diamine Orange G, R or combinations of *Diamine Yellow CP, *Diamine Scarlet B, Diamine Purpurine B or combinations of *Milling Yellow O, OO, *Diamine Scarlet B — Method XII, page 13. / Method III, page 6.

Pink:

a) Of good fastness to milling next to wool and cotton:

Rosazeïne B, 13 — Method III or I, pages 4 and 6

b) Of good fastness to milling next to wool:

Diamine Rose BD, GD, Direct Rose T, *Diamine Scarlet B, 3B brightened if necessary with Rosazeïne B, 13 — Method XII, page 13.

The dyestuffs marked with an asterisk (*) yield dyeings very fast to light.

Excellently fast to milling and light	Special properties of fastness
Yellow: Anthracene Yellow C Anthracene Yellow R Anthracene Yellow BN } Method IX, page 10. For greenish yellows: Anthracene Yellow GG, after-treated with chromium fluoride, Method IX. page 10.	Dyestuffs fast to steaming: All the dyestuffs mentioned possess excellent fastness to steaming. Dyestuffs fast to carbonising. All the dyestuffs mentioned, with the exception of Oxy Diamine Orange G Oxy Diamine Orange R Diamond Magenta Ia. Magenta yellow shade. A thorough neutralisation after carbonising is necessary with Diamine Purpurine B.
Orange: Combinations of Anthracene Yellow C Anthracene Yellow R Anthracene Yellow BN Diamine Fast Red F } Method IX, page 10.	Dyestuffs fast to stoving: All the dyestuffs mentioned, with the exception of Diamine Scarlet B Anthracene Yellow BN Oxy Diamine Orange G, R. The following are fairly fast to stoving and satisfactory for most purposes: Tropaeoline O Milling Red G Diamine Scarlet 3B Diamine Orange B Anthracene Yellow C, R, GG Diamond Magenta Ia Magenta yellow shade.
Pink: Diamine Fast Red F brightened if necessary with Rosazeine B 13 } Method XII, page 13.	

For light milling

Red and Claret:

*Scarlet FR, F2R, F3R
Scarlet EC
*Crystal Scarlet 6R
*Amaranth
*Croceïne AZ
*Lanafuchsine 6B
shaded if necessary with
Acid Violet 6BS
Acid Violet 6BC
*Tropaeoline O

} Method II, page 5.

Violet:

Methyl Violet 6B—4R
Crystal Violet 5B bluish, 10 B. Method XIII, page 14.

Acid Violet 6BC, 6BS
shaded if necessary with
*Lanafuchsine 6B

} Method I, page 4.

Further,

*Oxy Diamine Violet B, R
*Diamine Violet N
shaded if necessary with
Diamine Sky Blue FF
Diamine Blue RW
*Diaminogene extra

} Method XII, page 13.

For heavier milling

Red and Claret:

a) Of good fastness to milling next to wool and cotton:

Milling Red G
*Milling Red FR
shaded if necessary with
Rosazeïne B, 13
Formyl Violet S4B

} Method III, page 6.

b) Of good fastness to milling next to wool:

Wool Red BG
*Wool Red B

} Method III, page 6.

or

Diamine Red 4B, 6B, 10B
Diamine Purpurine B, 3B, 6B
*Diamine Scarlet B, 3B
*Diamine Brilliant Scarlet S
*Diamine Fast Red F
Diamine Bordeaux B*, S
*Diamine Brilliant Bordeaux R
shaded if necessary with
*Oxy Diamine Violet B
*Diamine Yellow CP

} Method XII, page 13.

Violet:

a) Of good fastness to milling next to wool and cotton:

Formyl Violet S4B, S5B, 6B, 8B, 10B
Alkaline Violet C, CA
shaded if necessary with
Brilliant Milling Blue B

} Method III, page 6.

b) Of good fastness to milling next to wool:

*Oxy Diamine Violet B
*Diamine Violet N

} Method XII, page 13.

The dyestuffs marked with an asterisk (*) yield dyeings very fast to light.

Excellently fast to milling and light	Special properties of fastness

Red and Claret:

Diamine Fast Red F
aftertreated with chrome, shaded if necessary with
Anthracene Yellow C
Anthracene Yellow BN
Wool Red B
Method XII, page 13.

further, combinations of

Diamine Fast Red F
Anthracene Chrome Violet B
Anthracene Chrome Blue R, F, FR
Formyl Violet S 4 B
(for blueing)
Method IX, page 10.

For dull clarets:

Anthracene Chrome Red A
shaded if necessary with
Anthracene Chrome Violet B
Method VIII, page 9.

Violet:

Anthracene Chrome Violet B
shaded if necessary with
Anthracene Chrome Blue R, F, FR

For brightening:
Formyl Violet S 4 B
Formyl Blue B
Brilliant Milling Blue B

Method VIII, page 9.

Dyestuffs fast to steaming:

All the dyestuffs mentioned are excellently fast to steaming with the exception of

Scarlet EC
Croceïne AZ
Diaminogene extra

the shades of which turn somewhat yellower and duller on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs mentioned, with the exception of

Amaranth
Lanafuchsine 6 B
Diamine Brilliant Bordeaux R
Methyl Violet B—4 R,

the shades of which turn somewhat bluer.

A thorough neutralising after the carbonising is required with

Diamine Brilliant Scarlet S
Diamine Red 4 B, 6 B, 10 B
Diamine Purpurine B, 3 B, 6 B
Diamine Bordeaux B.

Dyestuffs fast to stoving:

All the dyestuffs mentioned, with the exception of

Scarlet EC
Amaranth
Croceïne AZ
Milling Red FR
Wool Red B, BG
Formyl Violet 8 B, 10 B
Anthracene Yellow BN
Diamine Scarlet B
Diamine Bordeaux B
Diaminogene extra.

The following are fairly fast to stoving and satisfactory for most purposes :

Crystal Scarlet 6 R
Milling Red G
Formyl Violet 6 B
Methyl Violet B—4 R
Diamine Red 4 B, 6 B, 10 B
Diamine Scarlet 3 B
Anthracene Yellow C.

For light milling

For bright blues:

Thiocarmine R
Tetra Cyanole V, SF, extra
Brilliant Naphtol Blue 4 B, B, R
shaded with
Acid Violet 6 BS
Acid Violet 6 BC
→ Method I, page 4.

For navies and dark blues:

*Lanacyl Blue BB
*Lanacyl Blue R
*Lanacyl Violet B
*Lanacyl Navy Blue B
*Lanacyl Navy Blue BB
→ Method III, page 6.

*Peri Wool Blue B
*Peri Wool Blue BG
*Peri Wool Blue G
→ Method II, page 5.

or

Diamine Blue RW
*Diamine Blue RW aftertreated with sulphate of copper
Diamine Steel Blue L
*Diaminogene extra
→ Method XII, page 13.

The Lanacyl Colours are also used especially for blankets and coarse overcoatings which are milled with fuller's earth.

For heavier milling

For bright blues

Brilliant Milling Blue B
Formyl Blue B
Tetra Cyanole A
shaded with
Formyl Violet S 4 B
Billiant Milling Green B
→ Method III, page 6.

*Alkaline Blue 6 B—3 R
shaded if necessary with
Alkaline Violet CA, C
→ Method VI, page 8.

For navies and dark blues:

Azo Chrome Blue T, TB
Method VIII, page 9

*Alphanol Blue BR extra
Method V, page 8.

*Anthracite Black B, R
shaded with
Formyl Violet S 4 B—10 B
Brilliant Milling Blue B
Formyl Blue B
→ Method III, page 6

*Anthracene Acid Black S 8 B
shaded as stated above, or, combinations of
*Anthracene Chrome Black F, 5 B, P extra, PFB extra
*Anthracene Chrome Blue FR, F, R
*Anthracene Chrome Violet B
*Anthracene Acid Blue BB, BBN, 3 B
if necessary shaded as stated above.
→ Method IX, page 10.

Especially cheap navies and dark blues of moderate fastness to light may be produced with

Formly Violet S 4 B—10 B
in combination with
Logwood
→ dyed with the addition of 4 % sulphate of iron 2 % sulphate of copper 2—3 % oxalic acid, or on a chrome mordant (see page 88).

The dyestuffs marked with an asterisk (*) yield dyeings very fast to light.

Excellently fast to milling and light

Anthracene Chrome Blue F, FR — Method VIII, and for FR Method IX.

Anthracene Chrome Blue G, BB, B, R — Method VIII or X.

Anthracene Chrome Blue BW extra. RRW extra — Method X.

pages 9—11.

For cheaper blues:

Anthracene Acid Blue BBN, BB, 3B, RT — Method IX, page 10.

For especially bright blues:

Anthracene Acid Blue RR, Method X, page 11.

Suitable shading dyestuffs are the following:

Brilliant Milling Blue B
Formyl Blue B
Formyl Violet S4B—10B
Brilliant Milling Green B
— for bright blues.

Anthracene Chrome Black F, P extra, PFB extra (for one-bath dyeings)
Anthracene Acid Black DSF (for dyeings on chromed wool)
— For very deep shades of dark blue.

The following dyestuffs best withstand the potting process and cross-dyeing in an acid bath:

Anthracene Chrome Blue G, F, BB Method VIII, page 9.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs mentioned are excellently fast to steaming with the exception of

Thiocarmine R
Lanacyl Blue BB, R
Lanacyl Violet B
Peri Wool Blue B, BG
Alphanol Blue BR extra
Anthracite Black B, R
Anthracene Acid Black DSF
Diamine Blue RW, aftertreated with sulphate of copper
Diaminogene extra

which somewhat change their shade on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs mentioned, with the exception of

Alkaline Blue, all brands
Lanacyl Blue BB, R
Peri Wool Blue, all brands
Diamine Blue RW, aftertreated with sulphate of copper and the Logwood combination mentioned.

Dyestuffs fast to stoving:

All the dyestuffs mentioned, with the exception of

Thiocarmine R
Lanacyl Blue BB, R
Lanacyl Violet B
Lanacyl Navy Blue B, BB
Peri Wool Blue, all brands
Formyl Violet 8B, 10B
Alphanol Blue BR extra
Diaminogene extra and the Logwood combination mentioned.

Fairly fast to stoving and satisfactory for most purposes are the following:

Formyl Violet 6B
Diamine Blue RW, aftertreated with sulphate of copper
Anthracene Acid Black DSF.

For light milling

Naphtol Green B
Naphtol Dark Green G
shaded if necessary with
Lanacyl Blue BB, R
Milling Yellow O
Wool Red B
Cyanole Fast Green G,
for brightening

→ Method II, or Method III for combinations containing Lanacyl Blue, Milling Yellow, Wool Red; pages 5 & 6.

Or combinations of

Diamine Green G, B, CL
Diamine Dark Green N
Diamine Yellow CP
Diamine Brown 3G
Diamine Scarlet B

→ Method XII, page 13.

For very bright greens:

Acid Green extra conc.
Acid Green extra conc. B
Cyanole Fast Green G
shaded if necessary with
Acid Yellow AT

→ Method I, page 4.

The following dyestuffs of the above combinations yield dyeings very fast to light:

Naphtol Green B
Naphtol Dark Green G
Cyanole Fast Green G
Lanacyl Blue BB, R
Milling Yellow O
Wool Red B
Acid Yellow AT
Diamine Green G, B
Diamine Dark Green N
Diamine Yellow CP
Diamine Scarlet B.

For heavier milling

a) Of good fastness to milling next to wool and cotton:

Combinations of
Brilliant Milling Green B
Milling Yellow O
Milling Red G
Formyl Blue B
Tetra Cyanole A

→ Method III, page 6.

Still faster to milling are combinations of

Brilliant Milling Green B
Anthracene Yellow BN
Milling Red G
Formyl Blue B

→ Method IX, page 10.

For bright greens:

Brilliant Milling Green B
shaded with
Milling Yellow O

→ Method III, page 6.

Still faster to milling is

Brilliant Milling Green B
shaded if necessary with
Anthracene Yellow BN

→ Method IX, page 10.

b) Of good fastness to milling next to wool:

Combinations of
Diamine Green G
Diamine Fast Yellow FF
Diamine Catechine G
Diamine Brown M
Diamine Fast Red F
Diaminogene extra

→ Method XII, page 13, aftertreated if necessary with chromium fluoride.

The following dyestuffs of the above combinations yield dyeings very fast to light:

Milling Yellow O
Anthracene Yellow BN
Diamine Green G
Diamine Fast Yellow FF
Diamine Fast Red F
Diaminogene extra

Olive Shades on Loose Wool.

Excellently fast to milling and light	Special properties of fastness
Combinations of Anthracene Chrome Blue F, G, BB Anthracene Blue Black C Brilliant Milling Green B for brightening Anthracene Yellow BN Anthracene Chrome Brown D, DW, SWN Anthracene Chrome Red A Method VIII, page 9. or, combinations of Anthracene Chrome Blue F, G, BB Anthracene Blue Black C Brilliant Milling Green B, for brightening Anthracene Yellow C Anthracene Chrome Brown DWN Anthracene Acid Brown G, N, B Anthracene Chrome Black 5B, F, PFB extra, P extra for saddening Method IX, page 10. or again, combinations of Anthracene Chromate Green B Alphanol Blue BR extra Anthracene Blue Black C Brilliant Milling Green B, for brightening Anthracene Yellow BN, C Anthracene Chromate Brown 3G, EB Method XI, page 12.	Dyestuffs fast to steaming: All the dyestuffs mentioned are excellently fast to steaming with the exception of Naphtol Green B Lanacyl Blue BB, R Alphanol Blue BR extra Diamine Green B, G Diaminogene extra Diamine Catechine G, which change a little in shade on severe steaming. Dyestuffs fast to carbonising: All the dyestuffs mentioned, with the exception of Lanacyl Blue BB, R. Dyestuffs fast to stoving: All the dyestuffs mentioned, with the exception of Wool Red B Lanacyl Blue BB, R Alphanol Blue BR extra Acid Green extra conc. Acid Green extra conc. B. Diaminogene extra Diamine Scarlet B Anthracene Yellow BN Anthracene Acid Brown G Anthracene Chromate Brown 3G. The following are fairly fast to stoving and satisfactory for most purposes: Naphtol Green B Milling Red G Diamine Brown 3G Diamine Catechine G Anthracene Yellow C Anthracene Chrome Brown SWN, DWN Anthracene Chromate Brown EB.

For light milling
(Direct Acid Blacks, fast to light)

Alphanol Black BG, R — Method III, page 6.

Naphtyl Blue Black N, FB, FBB — Method IV, page 7.
(chiefly for blue blacks)

Alphanol Black and Naphtyl Blue Black FB and FBB possess the best fastness to milling and withstand even a rather severe milling.

For cheap, full blacks:

Naphtylamine Black NBB, RNB — Method IV, page 7.

Suitable shading products:

For blacks with a pronounced bluish cast:

Formyl Violet S4B—10B,
Brilliant Milling Blue B
Formyl Blue B
Tetra Cyanole A
Brilliant Milling Green B.

For jet blacks:

Milling Yellow O
Anthracene Yellow C.

Fast to milling and light

Anthracene Acid Black DSST
Anthracene Acid Black SW — Method IX, page 10.
For reddish blacks:
Anthracene Acid Black LW

The following products level very easily:

Anthracene Acid Black SR
Anthracene Acid Black SRG
Anthracene Acid Black SA
Anthracene Acid Black SBB

(For blue-blacks) Method VIII, page 9.

Anthracene Acid Black SR, SRG, SA and SBB are very fast to milling, especially next to wool, whereas the other brands are fast to milling both next to cotton and wool.

Suitable shading products:

For blacks with a very bluish cast:

Formyl Violet S4B—10B
Brilliant Milling Blue B
Formyl Blue B
Tetra Cyanole A
Brilliant Milling Green B
Anthracene Chrome Blue FR, F, BB
Anthracene Acid Blue BBN
Anthracene Chrome Violet B — for dyeings required to be particularly fast to light

For jet blacks:

Anthracene Yellow C, BN
Anthracene Acid Brown G.

Excellently fast to milling and light

Anthracene Chrome Black PFB extra, PFBB extra, PF extra, PFR extra, PR extra, P extra, PPN extra, 5B, F, FE, FR

Anthracene Acid Black DSN, DSF, DSFB, DNG

Method IX, page 10.

Withstanding the potting process best:

Anthracene Chrome Black P extra, PPN extra, PF extra, PFB extra, PR extra

Anthracene Chrome Black 5B.

For acid cross-dyeing, the following come into consideration:

Anthracene Chrome Black P extra, PF extra, PFB extra, F

Anthracene Acid Black DSN, DSF.

To obtain good fastness to acid cross-dyeing, the dyeings should be chromed somewhat more heavily than usual for instance with the following quantities:

1½% bichrome for 4% dyestuff
2 % ,, ,, 5% ,,
2½% ,, ,, 6% ,,

Suitable shading products:

The same as mentioned on page 30 under the heading of "Fast to milling and light".

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs mentioned withstand normal steaming.

The following are excellently fast to steaming:

Anthracene Acid Black, all brands, with the exception of LW, DSN, DSF and DSFB
Anthracene Chrome Black, all brands
Anthracene Chrome Blue ,, ,,
Anthracene Acid Blue ,, ,,
Anthracene Chrome Violet B
Anthracene Yellow C, BN
Anthracene Acid Brown G
Milling Yellow O
Formyl Violet, all brands
Brilliant Milling Blue B
Formyl Blue B
Tetra Cyanole A
Brilliant Milling Green B

Dyestuffs fast to carbonising:

All the dyestuffs mentioned with the exception of
Naphtyl Blue Black, all brands
Naphtylamine Black RNB, NBB
Anthracene Acid Black SW, LW

Dyestuffs fast to stoving:

All the dyestuffs mentioned, with the exception of
Alphanol Black BG, R
Naphtyl Blue Black, all brands
Naphtylamine Black RNB, NBB
Anthracene Acid Black SW, LW
Anthracene Yellow BN
Anthracene Acid Brown G
Formyl Violet 8B, 10B.

The following are fairly fast to stoving and satisfactory for most purposes:

Anthracene Yellow C
Formyl Violet 6B
Anthracene Acid Black SA, DSN, DSF, DSFB, DSST.

The Production of Mixtures of extremely good Fastness to Light.

In the place of white wool for producing pale mixtures fast to light, wool stained by means of metallic salts may be used, of which a much larger percentage may be employed than of the white wool without giving the mixture the appearance of unlevelness. This method holds out a special advantage in that correspondingly smaller quantities of the ground shade are necessary than when employing white wool for mixing, but being dyed double as deep again, the fastness to light of the mixture is increased enormously. The wool stained with metallic salts and to be used for mixing purposes possesses absolute fastness to light even when exposed for months or years. (See also the special chapter on Military and other Uniform or Livery Cloths). The method has been protected to us by Letters Patent in all countries. Two shades come chiefly into consideration for mixing purposes, viz:

A) Wool dyed a greenish shade:

Charge the bath with

3 % bichrome
0,5 % sulphate of copper
5—7 % formic acid 85 %,

enter the scoured wool at 60—70°C (140—160 deg. F.), raise to the boil, and continue boiling for 1 1/2 to 2 hours; the wool will first be of a yellow colour but will later on assume a green shade, and if the liquor is then perfectly clear, the wool is thrown out at once, rinsed, and dried.

B) Wool dyed a drab shade:

Dye the previously well scoured wool as described under (A); cool off the bath when exhausted, add

2 % thiosulphate (hyposulphite) of soda

and boil for another 1/2 hour; then rinse, and dry.

A similar shade is produced by boiling the wool with

2 % chrome alum
2 % sulphate of copper
3 % oxalic acid

and adding subsequently

2 % thiosulphate (hyposulphite) of soda.

DYEING OF SLUBBING AND YARN.

3 e u

Dyeing of Slubbing and Wool Yarn.

Washing and Degreasing of Slubbing. Before dyeing, the slubbing is as a rule wetted out evenly in the dyeing machine, and if necessary degreased with some ammonia. After dyeing, it is washed in the back-wash, given a light soap passage in order to facilitate further operations, dried, and combed.

Bleaching of Slubbing. Slubbing is bleached like wool yarn either by being hung up in the stoving chamber, or by being treated with bisulphite (see page 18). It may in certain instances also be bleached with peroxide of hydrogen or peroxide of soda, which process is described on page 36. These bleaching operations are to best advantage carried out in wooden vessels, using the slubbing in the form of hanks, not on bobbins. Machines used for bleaching with bisulphite should be tin-plated.

Scouring and Degreasing of Wool Yarn. Most yarns are scalded before the washing in order to avoid any felting and to keep them smooth and in good condition for reeling.

Greasy yarns should be thoroughly washed after the scalding; yarns which are not scalded must also be degreased well before dyeing. The scouring is done at 35—45° C (95—115 deg. F.) with the addition of about 3 % soda or ammonia and 5 % soap, calculated on the weight of the yarn.

Knitting and hosiery yarns intended to be dyed *black* are sometimes not degreased until after the dyeing, being then rinsed in a lukewarm bath containing 2 % soda (of the weight of the yarn) and soaped at 45° C (115 deg F.) in as soft water as possible (best of all condensed water) with 10 % neutral soap; they are then thoroughly hydroextracted and dried without rinsing.

Bleaching of Wool Yarn. This material is bleached according to various methods.

Stoving. Enter the well scoured yarns at 40—50° C (105—120 deg. F.) into a soap bath containing 3—8 oz neutral soap or curd soap per 10 gallons liquor, according to the hardness of the water, work well for 1/4 to 1/2 hour, throw out, whizz as evenly as possible but not too severely, hang overnight in the stoving chamber, wash well the next morning, and dry, best in a shady place, in the air, or in the drying chamber at not too high a temperature. In order to improve the clearness of the white, add to the soap bath as per details given on page 18 a small quantity of Blue, Violet, etc. or some Alkaline Blue.

Bleaching with Bisulphite. This very common method is described on page 18.

Bleaching with Permanganate and Sulphurous Acid. Work the well scoured and wetted material for 1/2 hour in a cold bath containing 3—4 1/2 oz permanganate of potash per 10 gallons liquor, throw out, allow to drain, and enter into a fresh bath charged with 4 lbs bisulphite of 70—77 deg Tw. and 4 1/2 oz concentrated sulphuric acid per 10 gallons liquor. Leave the yarns in this bath for about 2 hours whilst turning them frequently, or immerse after having turned them several times, taking care that they are completely covered by the liquor, and only lift when they have changed from the brown colour they had at first assumed to a pure white. Then rinse thoroughly, and dry at a moderate temperature.

Bleaching with Peroxide of Hydrogen or Sodium Peroxide yields the clearest white. This operation is carried out in wooden, stone, cement or earthenware troughs which should be provided with a lead steam-coil. The starting baths are charged per 10 gallons cold water:

a) when using *peroxide of hydrogen*, with
1 1/2—2 gallons peroxide of hydrogen (commercial quality) of 3%, and just enough ammonia to make the bath react slightly alkaline (bluing red litmus paper just slightly);

b) when using *sodium peroxide*, with
10 – 21 oz concentrated sulphuric acid and
1/2—1 lb sodium peroxide;

the latter is gradually added, whilst stirring, to the acidulated bath, which is then neutralised with ammonia as above stated.

The bath is then heated to 40° C. (105 deg F.), the well scoured wool entered, worked for some time, and then immersed so as to be completely covered by the liquor; it is then left for several hours in this bleaching liquor at a temperature of 40 to 50° C (105–120 deg. F.) until the desired effect has been attained. Wools which are difficult to bleach or which are to be bleached a very pure white are then thrown out and left lying overnight unrinsed in a place free from dust. The next day the goods are soured off in fresh, cold water with the addition of $^1/_2$ gallon bisulphite of 70—77 deg. Tw. and $^1/_2$ pint concentrated sulphuric acid per 10 gallons liquor, rinsed in fresh water which may contain traces of a blue or violet dyestuff for brightening, whizzed, and dried at not too high a temperature. The baths for the bleaching may be used over again, and to this end are acidulated with just enough sulphuric acid to show a slightly acid reaction (blue litmus paper must just be reddened by the liquor); when used for subsequent lots they are then freshened up with one-third to one-half the quantities used for the starting bath, as above stated.

Silicate of soda may be used in the place of ammonia for neutralising the bleaching liquors; in such case the unexhausted bleaching liquors are used for giving the goods a preliminary bleach in the old baths without any further addition, the bleaching being then completed in a stronger fresh bath.

The sodium peroxide is weighed on stone, metal, glass or porcelain, because the dry product must not come into contact with wood, paper, paste-board, etc.

Dyeing. **Slubbing** is mostly dyed in the form of tops, machines being used in which either several tops are placed on a cylindrical perforated pipe, or which contain a number of receptacles (revolvers) with perforated bottoms and front-pieces each to be filled with one or more of these tops. The liquor is forced or sucked through the tops by means of a pump or similar mechanical contrivance. With some machines it may be requisite to turn the bobbins once during the dyeing operation. Machines similar to the Klauder-Weldon hank dyeing machine are also in use, in which the slubbing is worked in the form of hanks on a winch partly submerged in the liquor.

Woollen and worsted yarns are mostly dyed in form of hanks in vats, sometimes also in machines, the latter being especially useful for the dyeing of knitting yarns, Berlin wool,

and other materials prone to felt. Quite recently, yarn is also machine-dyed, in the form of cops or cheeses. For detailed instructions of machine-dyeing see the subsequent separate chapter dealing with this subject.

Yarns in hanks are as a rule dyed in rectangular wooden vats, a little higher than the reel of the hanks to be dyed. Open or closed steam pipes of copper or hard lead are used for heating the vats; iron pipes are less suitable.

The vats should be of a capacity to hold a volume of liquor corresponding to about 40 times the weight of the yarn to be dyed.

For the dyeing of Slubbing and Yarn,

1) Acid Colours,
2) Anthracene Colours,
3) Diamine Colours,
4) Basic Colours and Eosines

may be used, according to the demands made.

The Acid Colours are used on slubbing for producing dyeings at as low a cost as possible, principally for slubbing used for hat and fancy trimmings, embroidery and knitting yarns, and Berlin wool For yarns, Acid Colours are used very extensively, serving chiefly for the dyeing of fancy yarns, Berlin wool, embroidery, knitting and carpet yarns.

Anthracene Colours (Chrome Colours) are given the preference for dyeings which in addition to very good fastness to light are required to possess best possible fastness to milling.

Diamine Colours are used very extensively for the production of dyeings fast to washing and milling, especially pale compound shades, yellows, reds, clarets, and browns. They are especially favoured for the dyeing of knitting, hosiery and carpet yarns, as well as of yarn for the manufacture of flannels, blankets, and the like.

Basic Colours and Eosines are applied principally for the dyeing of Berlin wool and for producing bright shades such as for instance, light sulphurised (stoved) colours, red, green, etc.

For details relating to the stripping — before dyeing — of yarns manufactured from coloured shoddies, see the instructions

regarding the stripping of coloured shoddy given in the subsequent chapter on the dyeing of Half-wool and Shoddy.

The Production of Mixtures very fast to Light.

The method described on page 32 for loose wool may also be applied for the dyeing of slubbing. This material is stained with metallic salts to pale shades, in dyeing machines, and the wool so dyed, which possesses a fastness to light unattainable with other dyestuffs, may then be used for pale mixtures distinguished by an eminent resistance to light.

Simplest and cheapest method of production

Combinations of

Naphtol Yellow S
Indian Yellow FF
Orange II, extra
Azo Orseille BB
(for light shades)
Lanafuchsine SB, SG
(for fuller shades)
Indigo Blue N

or, of somewhat better fastness to light, of

Acid Yellow AT
Tropaeoline OO, O
Orange GG, II, extra, IV
Azo Orseille BB
(for light shades)
Lanafuchsine SB, SG
(for fuller shades)
Cyanole Green B, 6G
Tetra Cyanole V

Of still better fastness to light, of

Acid Yellow AT
Orange GG,
Lanafuchsine SG
Cyanole Fast Green G.

Method I, page 4.

The following dyestuffs of the above combinations are fastest to light:

Acid Yellow AT
Indian Yellow FF
Orange, all brands
Azo Orseille BB
Lanafuchsine SB, SG
Cyanole Fast Green G
Cyanole Green B, 6G
Tetra Cyanole V.

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton:

Combinations of

*Milling Yellow O, OO
Milling Red G
*Wool Red B, BG
Brilliant Milling Green B
*Cyanole Fast Green G
Formyl Violet S4B

Method III, page 6.

or of

*Diamine Fast Yellow FF
Diamine Brown M, B
Diamine Catechine G
*Diamine Fast Red F
*Diamine Violet N
*Diaminogene extra

Method XII, page 13, with after-treatment with chrome.

For Greys:

*Anthracite Black B
*Anthracite Black R
*Diaminogene extra

Method III, page 6.
Method XII, page 13.

Of good fastness to washing and milling next to wool:

Combinations of

*Diamine Yellow CP
Diamine Brown R, M, B
Oxy Diamine Brown G
Diamine Catechine G
*Diamine Scarlet B, 3B
Diamine Rose BD
*Diaminogene extra
*Oxy Diamine Violet B

Method XII, page 13.

The dyestuffs marked with an asterisk (*) are fastest to light.

Browns on Slubbing and Yarn.

Excellently fast to milling and light

Combinations of

Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chrome Brown D, DW, SWN
Anthracene Chrome Red A
Anthracene Blue Black C
Anthracene Chrome Blue G, BB, F
Anthracene Chrome Violet B

} Methods VIII or X pages 9 and 11

For brown shades also combinations of

Anthracene Chrome Brown DWN
Anthracene Acid Brown G, N, B, V
Anthracene Yellow BN, C
Anthracene Chrome Red A

} Method IX, page 10.

Anthracene Blue Black C
Anthracene Chrome Blue G, BB, R
Anthracene Chrome Violet B
Anthracene Chrome Black F, P, extra, PFB extra

} Method IX, page 10.

or:

Anthracene Chromate Brown EB, 3G
Anthracene Yellow BN, C
Alphanol Blue BR extra
Anthracene Blue Black C
Wool Red B

} Method XI, page 12.

For pearl shades:

Anthracene Chrome Blue BB, G
Anthracene Blue Black C

dyed with the addition of

1—2 % chromium fluoride
2—3 % acetic acid

or

2—4 chrome alum
2—3 % acetic acid

for ¾ to 1 hour at the boil.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs named are excellently fast to steaming, with the exception of

Alphanol Blue BR extra
Anthracite Black B, R
Diamine Brown R
Oxy Diamine Brown G
Diamine Catechine G
Diaminogene extra,

the shades of which are slightly changed on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs named are fast to carbonising, with the exception of

Azo Orseille BB
Oxy Diamine Brown G

which become somewhat bluer in shade.

The material must be well neutralised after carbonising when dyed with one of the following dyestuffs:

Tropaeoline OO, Orange IV
Diamine Brown R.

Dyestuffs fast to stoving:

All the dyestuffs named, with the exception of

Indigo Blue N, Wool Red B, BG
Alphanol Blue BR extra
Diamine Scarlet B
Diamine Brown R
Oxy Diamine Brown G
Diaminogene extra
Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chromate Brown 3G,

Fairly fast to stoving and satisfactory for most purposes are

Tropaeoline O, OO, Orange II
Milling Red G
Diamine Scarlet 3B
Diamine Catechine G
Anthracene Yellow C
Anthracene Chrome Brown SWN, DWN
Anthracene Chromate Brown EB.

Simplest and cheapest method of production

Yellow.

For very bright yellows:

*China Yellow B
Naphtol Yellow S
*Acid Yellow AT
*Fast Yellow S
— Method I, page 4.

or for the dyeing of yarn:

Thioflavine T, Method XIII, page 14, pale shades according to instructions on page 54.

For more covered yellows:

*Metanil Yellow
*Tropaeoline O, OO, G
*Orange IV
Indian Yellow G, R, FF
— Method I, page 4.

Orange.

*Orange GG, II, extra, R
*Orange EN, ENZ
— Method I, page 4.

For very bright oranges:

Combinations of
Naphtol Yellow S
*Acid Yellow AT
Rosazeïne B, 13
— Method I, page 4.

or especially for the dyeing of yarn:

Thioflavine T
Rosazeïne B, 13
Irisamine G
— Method XIII, page 14; pale shades according to page 54

Pink:

Rosazeïne B, 13
Irisamine G
— Method III, page 6.

Eosines all brands — Method VIII, page 8;

pale shades according to instructions on page 54.

For very cheap pinks:

Diamond Magenta Ia
Magenta yellow shade
— Method XIII, page 14

Of good fastness to washing and milling

Yellow.

a) Of good fastness to washing and milling next to wool and cotton:

*Milling Yellow O, OO, Method III, page 6.

b) Of good fastness to washing and milling next to wool:

Thioflavine S
*Diamine Fast Yellow FF
*Diamine Yellow CP
*Diamine Gold
— Method XII, page 13.

Orange.

a) Of good fastness to washing and milling next to wool and cotton:

Combinations of
*Milling Yellow O, OO
Milling Red G
Rosazeïne B, 13
— Method III, page 6.

b) Of good fastness to washing and milling next to wool:

Oxy Diamine Orange G, R
Diamine Orange F, B
or combinations of
*Diamine Yellow CP
*Diamine Scarlet B
Diamine Purpurine B
— Method XII, page 13.

Pink.

a) Of good fastness to washing and milling next to wool and cotton:

Rosazeïne B, 13
Irisamine G
— Method III, page 6; shades according to page 54

b) Of good fastness to washing and milling next to wool:

Diamine Rose BD, GD
Direct Rose T
*Diamine Scarlet B, 3B
Rosazeïne B, 13
— Method XII, page 13.

The dyestuffs marked with an asterisk (*) yield dyeings very fast to light.

Excellently fast to milling and light	Special properties of fastness

Yellow.

Anthracene Yellow BN, Anthracene Yellow C, Anthracene Yellow R — Method IX, page 10.

For greenish yellows:

Anthracene Yellow GG, aftertreated with chromium fluoride. Method IX, page 10.

Orange.

Combinations of

Anthracene Yellow BN, Anthracene Yellow C, Anthracene Yellow R, and Diamine Fast Red F — Method IX, page 10.

Pink.

Diamine Fast Red F, dyed direct, shaded with Rosazeïne B, 13 — Method XII, page 13.

Dyestuffs fast to steaming:

All the dyestuffs named, with the exception of

Thioflavine T
Eosine BN
Eosine Scarlet B
Erythrosine, all brands
Rose Bengale extra N

the shades of which are changed a little on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs named, with the exception of

Thioflavine T
Eosine, all brands
Diamond Magenta I a
Magenta yellow shade
Irisamine G
Oxy Diamine Orange G, R.

The material must be well neutralised after carbonising when dyed with one of the following dyestuffs:

Fast Yellow S
Metanil Yellow
Tropaeoline OO, G
Orange IV
Diamine Purpurine B.

Dyestuffs fast to stoving:

All the dyestuffs named with the exception of

Fast Yellow S
Anthracene Yellow BN
Oxy Diamine Orange G, R
Diamine Scarlet B

The following are fairly fast to stoving and satisfactory for most purposes:

Metanil Yellow
Tropaeoline, all brands
Orange IV, Milling Red G
Anthracene Yellow C, R, GG
Diamine Orange B
Diamine Scarlet 3B
Diamond Magenta I a
Magenta yellow shade.

Simplest and cheapest method of production

Red and Claret.

- *Brilliant Scarlet, all brands
- *Crystal Scarlet 6 R
- *Scarlet FR, FRR, F 3 R
- Scarlet EC
- *Brilliant Cochineal 2 R, 4 R
- *Naphtol Red EB, C
- *Amaranth, *Azo Rubine A
- Azo Red A, Roccelline
- *Brilliant Croceïne, all brands (especially fast to light.)
- *Croceïne AZ

(Method II, page 5.)

- *Lanafuchsine SG, SB, 6 B
- *Azo Orseille BB
- Acid Magenta

and for very fiery reds:

- Rosazeïne B

in combination with

- *Orange extra or
- Naphtol Yellow S

(Method I, page 4.)

Violet.

- Acid Violet 6 BS, 4 RS
- *Azo Wool Violet 7 R, 4 B

(Method I, page 4.)

- *Lanacyl Violet B, Method III, page 6.
- Methyl Violet 6 B—4 R
- Crystal Violet 5 B bluish, 10 B

(Method XIII, page 14.)

- Methyl Violet 6 B—3 B
- Crystal Violet 5 B bluish, 10 B

for very light clear lilac shades dyed in a soap bath and stoved: page 54.

Of good fastness to washing and milling

Red and Claret.

a) Of good fastness to washing and milling next to wool and cotton:

- Milling Red G, *FR shaded with Rosazeïne B, 13
- Formyl Violet S 4 B
- Tetra Cyanole A

(Method III, page 6.)

b) Of good fastness to washing and milling next to wool:

- *Wool Red B, BG shaded with Formyl Violet S 4 B
- *Milling Yellow O

(Method III, page 6.)

- Diamine Red 4 B, 6 B, 10 B
- Diamine Purpurine B, 3 B, 6 B
- *Diamine Scarlet B, 3 B
- *Diamine Fast Red F (direct)
- Diamine Bordeaux S, *B
- Diamine Brilliant Bordeaux R

shaded if necessary with

- *Oxy Diamine Violet B
- *Diamine Yellow CP

(Method XII, page 13.)

Satisfactory for many purposes are:

- *Scarlet FR, F 2 R, F 3 R
- *Croceïne, all brands

(Method II, page 5.)

Violet.

a) Of good fastness to washing and milling next to wool and cotton:

- Formyl Violet S 4 B—10 B
- Alkaline Violet CA, C

(Method III, p. 6.)

b) Of good fastness to washing and milling next to wool:

- *Oxy Diamine Violet B, R
- *Diamine Violet N

(Method XII, page 13.)

The dyestuffs marked with an asterisk (*) yield dyeings of very good fastness to light.

Violet on Slubbing and Yarn.

Excellently fast to milling and light

Red and Claret.

Diamine Fast Red F, chromed
shaded if necessary with
Anthracene Yellow BN,
Wool Red B [C

→ Method XII, page 13.

Also combinations of

Diamine Fast Red F
Anthracene Chrome Violet B
Anthracene Chrome Blue R, F, FR
Formyl Violet S4B (for brightening)

→ Method IX, page 10.

For duller claret shades:

Anthracene Chrome Red A
shaded if necessary with
Anthracene Chrome Violet B

→ Method VIII, page 9.

Violet.

Anthracene Chrome Violet B
shaded if necessary with
Anthracene Chrome Blue R, F, FR

Suitable for brightening:
Formyl Violet S4B
Brilliant Milling Blue B
Formyl Blue B

→ Method VIII, page 9.

Special properties of fastness

Dyestuffs fast to stoving:

All the dyestuffs named, with the exception of

Brilliant Scarlet R—4R *6R
*Crystal Scarlet 6R
*Roccelline, Scarlet EC
Naphtol Red EB, C, Amaranth
Brilliant Croceïne, Croceïne AZ
Milling Red FR, *G, Wool Red B, BG
Acid Magenta, Acid Violet 4RS
Lanacyl Violet B
Formyl Violet *6B, 8B, 10B
Diamine Scarlet B, *3B
*Diamine Red 4B, 6B
Diamine Bordeaux B
Diaminogene extra
Anthracene Yellow BN, *C
Methyl Violet B—4R.

The dyestuffs marked with an asterisk (*) are satisfactory for most purposes in fastness to stoving.

Dyestuffs fast to steaming:

All the dyestuffs named with the exception of

Brilliant Croceïne, Croceïne AZ
Scarlet EC, Acid Violet 4RS
Lanacyl Violet B, Diaminogene extra

Dyestuffs fast to carbonising:

All the dyestuffs named with the exception of

Acid Violet, 4RS, Irisamine G
Diamine Brilliant Bordeaux R
Methyl Violet B—4R.

Naphtol Red C, Amaranth
Brilliant Orseille C
Lanafuchsine 6B
Azo Wool Violet 7R

→ are fairly fast to carbonising

Diamine Red 4B, 6B, 10B
Diamine Purpurine all brands
Diamine Brilliant Scarlet S
Diamine Bordeaux B

→ must be well neutralised after carbonising

Simplest and cheapest method of production

For bright blues:

*Cyanole FF, extra, AB
*Tetra Cyanole V, SF, extra
Indigo Blue N, SGN
shaded if necessary with
Acid Violet 6BS

Method I, page 4.

also

Alkaline Blue, all brands
shaded if necessary with
Alkaline Violet CA, C

Method VI, page 8.

For very clear, light shades of blue on yarn:

Victoria Blue B, dyed in a soap bath and subsequently stoved (see page 54).

For navies and dark blues:

*Azo Wool Blue SE, SER
*Azo Navy Blue B, 3B
*Acid Navy Blue A
Brilliant Naphtol Blue 4B*, B*, R
*Azo Wool Violet 4B, 7R
shaded with
Acid Violet 6BS
*Orange GG, II, extra
*Cyanole Green B, 6G
*Cyanole Fast Green G etc.

Method I, page 4.

For shades excellently fast to light:

*Peri Wool Blue B, BG, G
Method II, page 5.
*Lanacyl Blue BB, R
*Lanacyl Navy Blue B, BB
*Lanacyl Violet B
*Naphtol Blue G, R

Method III, page 6.

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton.

For bright blues:

Brilliant Milling Blue B
Formyl Blue B
*Tetra Cyanole A
shaded if necessary with
Formyl Violet S4B
Brilliant Milling Green B

Method III, for Tetra Cyanole also Method I page 6 and 4.

*Alkaline Blue, all brands
Alkaline Violet CA, C

Method VI, page 8.

Water Blue R, B, RB,
Method II, page 5.
Water Blue and Alkaline Blue must be soured off after milling.

For navies and dark blues:

*Azo Chrome Blue, Meth. VIII, p. 9.
Alphanol Blue BR extra, M.V, p. 8.
*Anthracite Black B, R
shaded with the above stated dyestuffs.
Method III, page 6.
*Anthracene Acid Black SBB
*Anthracene Chrome Black F, 5B, P extra, PFB extra
shaded as before stated, or with
*Anthracene Chrome Blue FR, F, R
Method IX, page 10.

Combinations of Formyl Violet S4B—10B Logwood
dyed with
4% sulphate of iron
2% sulphate of copper
2—3% oxalic acid
or on chromed yarn
(page 88).

b) Of good fastness to washing and milling next to wool:

Diamine Sky Blue FF
Diamine Blue, RW, 2B, 3B, BX
Diamine Steel Blue L
*Diaminogene extra

Meth. VII, page 13

The dyestuffs marked with an asterisk (*) yield dyeings of good fastness to light

Excellently fast to milling and light

Anthracene Chrome Blue F, G, BB, B, R — Method VIII, page 9.

Anthracene Chrome Blue FR, Method IX, page 10.

Anthracene Chrome Blue BW extra, RRW extra, G, B, BB, R, Method X, page 11.

For cheaper blues:

Anthracene Acid Blue BBN, BB, 3B, RT — Method IX, page 10.

For especially bright blues:

Anthracene Chrome Blue FD; Anthracene Acid Blue GG, RR — Method X, page 11.

Suitable shading dyestuffs:

Brilliant Milling Blue B
Formyl Blue B
Tetra Cyanole A
Formyl Violet S4B—10B
Brilliant Milling Green B
— for brighter blues

Anthracene Chrome Black F, P extra, PFB extra (for one-dip dyeings)
Anthracene Acid Black DSF, DSN (for dyeings on a mordant)
— for very deep shades of dark blue

Withstanding best the potting process and acid cross-dyeing:

Anthracene Chrome Blue G, F, BB — Method VIII, page 9.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs named, with the exception of
Peri Wool Blue B, BG
Lanacyl Blue BB, R
Lanacyl Violet B
Alphanol Blue BR extra
Anthracite Black B, R
Anthracene Acid Black DSF, DSN
Diamine Sky Blue FF; Diamine Blue RW — aftertreated with sulphate of copper
Diaminogene extra, Victoria Blue B the shades of which are changed somewhat on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs named, with the exception of
Azo Wool Violet 7R (fairly fast)
Lanacyl Blue BB, R
Peri Wool Blue, Water Blue
Victoria Blue B, Alkaline Blue
Diamine Sky Blue FF; Diamine Blue RW — aftertreated with sulphate of copper
and the Logwood combination stated.

Dyestuffs fast to stoving:

All the dyestuffs named, with the exception of
Indigo Blue N, SGN
Peri Wool Blue, all brands
Lanacyl Blue BB, R,
Lanacyl Navy Blue B, BB
Lanacyl Violet B
Water Blue, Acid Green,
Formyl Violet 8B, 10B
Alphanol Blue BR extra
Diaminogene extra
and the Logwood combination stated.

The following are fairly fast to stoving and satisfactory for most purposes:
Formyl Violet 6B
Anthracene Acid Black DSF, DSN
Diamine Sky Blue FF; Diamine Blue RW — aftertreated with sulphate of copper

Simplest and cheapest method of production

* Cyanole Green B, 6G
* Cyanole Fast Green G
* Naphtol Dark Green G
shaded if necessary with
Naphtol Yellow S
* Indian Yellow FF
* Tropaeoline OO, O
* Orange II, extra, IV, GG
* Lanafuchsine SG
* Azo Wool Blue SE

→ Method I, page 4.

Excellently fast to light:

* Naphtol Green B
shaded with
* Acid Yellow AT
* Orange GG
* Lanafuchsine SG
* Peri Wool Blue G
* Cyanole Fast Green G

→ Method II, page 5.

For brigt greens:

Acid Green extra conc, extra conc. B, 5G
Fast Acid Green BN
* Cyanole Fast Green G
shaded with
* Acid Yellow AT
* China Yellow B
Naphtol Yellow S
* Tetra Cyanole V
or combinations of

→ Method I, page 4.

Solid Green crystals O
Brilliant Green crystals
and extra
Thioflavine T

→ Method XIII, page 14.

For very light, clear yellow-greens
combinations of
Thioflavine T
Victoria Blue B
→ dyed in a soap bath and subsequently stoved (see page 54).

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton:

Combinations of
Brilliant Milling Green B
* Milling Yellow O, OO
* Wool Red B, BG
Formyl Blue B
* Tetra Cyanole A

→ Method III, page 6.

Of even better fastness to milling:

Combinations of
Brilliant Milling Green B
* Anthracene Yellow BN
Milling Red G
Formyl Blue B

→ Method IX, page 6.

For deeper shades:

Combinations of
* Diamine Green G
* Diamine Fast Yellow FF
Diamine Catechine G
* Diamine Brown M
* Diaminogene extra

→ Meth XII, page 13, and after-treatment with chromium fluoride.

b) Of good fastness to washing and milling next to wool:

* Diamine Green G, B, CL
* Diamine Dark Green N
* Diamine Yellow CP
* Diamine Brown 3G
* Diamine Scarlet B

→ Method XII, page 13.

If the demands for fastness are less exacting, the following combinations may also be used:

* Cyanole Fast Green G
* Acid Yellow AT
* Tropaeoline O
* Orange GG
* Lanafuchsine SG

→ Method I, page 4.

The dyestuffs marked with an asterisk (*) yield dyeings of good fastness to light.

Exceedingly fast to milling and light	Special properties of fastness
Combinations of Anthracene Chrome Blue G, BB, F Anthracene Blue Black C Brilliant Milling Green B (for brightening) Anthracene Yellow BN Anthracene Chrome Brown SWN, DW, D Anthracene Chrome Red A (Methods VIII or X, pages 9 and 11.) or of Anthracene Chrome Blue G, BB Anthracene Blue Black C Brilliant Milling Green B (for brightening) Anthracene Yellow C, BN Anthracene Chrome Brown DWN Anthracene Acid Brown G, N, B Anthracene Chrome Black F, 5B, P extra, PFB extra (for saddening of one-bath dyeings) (Methods IX or X, pages 10 and 11.) or again of Anthracene Chromate Green B Alphanol Blue BR extra Anthracene Blue Black C Brilliant Milling Green B (for brightening) Anthracene Yellow BN, C Anthrace Chromate Brown 3G, EB (Method XI, page 12.)	Dyestuffs fast to steaming: The dyestuffs mentioned are excellently fast to steaming, except the following: Naphtol Green B Alphanol Blue BR extra Diamine Green G, B Diaminogene extra Diamine Catechine G Thioflavine T, Victoria Blue B, which are altered a little by severe steaming. Dyestuffs fast to carbonising: The dyestuffs mentioned, with the exception of Peri Wool Blue G Thioflavine T, Victoria Blue B. Good neutralising after carbonising is necessary in the case of Tropaeoline OO, Orange IV. Dyestuffs fast to stoving: The dyestuffs mentioned, excepting: Acid Green, all brands Fast Acid Green BN Peri Wool Blue G, Wool Red B, BG Alphanol Blue BR extra Diaminogene extra Diamine Scarlet B Anthracene Yellow BN Anthracene Acid Brown G Anthracene Chromate Brown 3G Solid Green, Brilliant Green. The following are fairly fast to stoving and sufficiently good in this respect for most requirements: Naphtol Green B, Milling Red G Tropaeoline OO, O, Orange IV Diamine Catechine G Diamine Brown 3G Anthracene Yellow C Anthracene Chrome Brown SWN, DWN Anthracene Chromate Brown EB.

Cheapest and simplest method of production
(Direct Acid Blacks fast to light)

For bluish blacks:

Naphtylamine Black S, ES8B, ES5B, ES3B, 7BS, 4BS, SGG — Method II, p. 5
Naphtylamine Blue Black 5B — Method II, p. 5
Naphtol Black 6B, 3B — Method II, p. 5
Naphtylamine Black 4B, 6B — Method III, page 6.

For covered shades of black:

Naphtylamine Black ESN, ESS, T TJ, TN, SS2B, SS3B — Method II, p. 5
Naphtylamine Blue Black B, BD — Method II, p. 5
Naphtol Black 2B, B, SG, M — Method II, p. 5
Naphtylamine Black X2B, X3B, OO — Method III, page 6.

With particularly good levelling properties:

For blue-black:
Azo Merino Black 8B, 6B, 6BE — Method I, page 4
For jet black:
Azo Merino Black B, BE — Method I, page 4

Suitable shading dyestuffs:

For very bluish blacks:
Acid Violet 6BS
Brilliant Milling Blue B
Tetra Cyanole V
Cyanole Green B, 6G
Acid Green extra conc.

For jet blacks:
Indian Yellow FF
Tropaeoline OO
Acid Yellow AT
Orange II, extra.

Fast to washing, milling and light

a) Of good fastness to washing and milling next to wool and cotton:

Anthracene Acid Black DSST, SW, LW — Method IX, p. 10

The following level particularly well:

Anthracene Acid Black SR, SRG, SA, SBB — Method VIII, p. 9.
Naphtyl Blue Black FB, FBB — Method IV, page 7.

further:

Alphanol Black BG, R — Method III, p. 6.
Anthracite Black B, R — Method III, p. 6.

b) Of good fastness to washing and milling next to wool:

Naphtyl Blue Black N — Method IV, page 7.
Naphtylamine Black NBB, RNB, R — Method IV, page 7.

On knitting yarns etc. which are not decatised the before-mentioned Acid Blacks may be dyed without sulphate of copper. Sulphate of copper however increases the weight of the wool by about 2% and enhances the fastness to washing.

The following are also used very largely for knitting and hosiery yarns:

Naphtylamine Black 4B, 6B, X2B, X3B — Method III, page 6.

For specially cheap blacks:

Naphtyl Blue Black N — dyed with copperas, sulphate of copper, oxalic acid (page 85)
Naphtylamine Black NBB, RNB — dyed with copperas, sulphate of copper, oxalic acid (page 85)
with logwood, fustic — dyed with copperas, sulphate of copper, oxalic acid (page 85)

Suitable dyestuffs for shading:

Those given in the first column of the next page.

Exceedingly fast to milling and light

Anthracene Chrome Black PFB extra, PFBB extra, PF extra, PFR extra, P extra, PPN extra, PR extra, 5B, F, FE, FR
Anthracene Acid Black DSN, DSF, DSFB, DNG

Method IX, page 10

The following resist the potting process best:

Anthracene Chrome Black P extra, PPN extra, PF extra, PFB extra, PR extra, 5B.

For goods which are cross-dyed subsequently:

Anthracene Chrome Black P extra, PF, extra, PFB extra, F
Anthracene Acid Black DSN, DSF

In order to obtain good fastness to acids, the dyeings intended for this purpose should be chromed somewhat more than usual, viz.

for 4% dyestuff with 1½% bichrome
,, 5% ,, ,, 2 % ,,
,, 6% ,, ,, 2½% ,,

Suitable dyestuffs for shading:

For very bluish blacks:

Formyl Violet S4B—10B
Brilliant Milling Blue B
Formyl Blue B
Brilliant Milling Green B

and for Anthracene Colours:

Anthracene Chrome Blue FR, F, BB, B
Anthracene Chrome Violet B
} for dyeings of particularly good fastness to light.

For jet black:

Anthracene Yellow C, BN
Anthracene Acid Brown G.

Special properties of fastness

Dyestuffs fast to steaming:

The dyestuffs mentioned are excellently fast to steaming, except the following:

Napthylamine Black 4B, 6B, X2B, X3B, OO
Naphtyl Blue Black, all brands
Naphtylamine Black RNB, NBB, R
} dyed without addition of sulphate of copper, or milled alkaline.

Alphanol Black BG, R
Anthracite Black B R,
Anthracene Acid Black LW, DSN, DSF, DSFB

and the Logwood combination referred to before.

The dyeings are altered to some extent by severe steaming, but resist normal steaming perfectly well.

Dyestuffs fast to carbonising:

The products mentioned, with the exception of

Naphtyl Blue Black, all brands
Naphtylamine Black NBB, RNB, R
} dyed with the addition of sulphate of copper

Anthracene Acid Black SW, LW

and the Logwood combination referred to.

A thorough neutralisation after carbonising is necessary in the case of Azo Merino Black, Tropaeoline OO.

Dyestuffs fast to stoving:

The products mentioned, with the exception of

Naphtylamine Black 4B, 6B, X2B, X3B, OO, NBB, RNB, R
Naphtyl Blue Black, all brands
Alphanol Black BG, R
Anthracene Acid Black SW, LW
Anthracene Yellow BN
Anthracene Acid Brown G
Acid Green extra conc.
Formyl Violet 8B, 10B

and the Logwood combination referred to.

The following are as a rule found sufficiently fast to stoving:

Naphtylamine Black ES8B, ES5B, ES3B, ESS, ESN
Naphtylamine Blue Black B, BD
Anthracene Acid Black DSN, DSF, DSST, DSFB, SA
Anthracene Yellow C, Tropaeoline OO, O
Formyl Violet 6B.

Chloring of Wool; Production of Silk-Wool.

By treating wool with solutions of chloride of lime and dilute acid, the fibre attains a higher degree of brilliancy and is less liable to shrink or felt. At the same time its affinity for most dyestuffs is considerably enhanced, which property may be taken advantage of in producing two-coloured effects on all-woollen piece-goods, according to our patented process described in British Patent No. 14472[98].

By a subsequent soaping a very soft handle is imparted to the chlored and dyed wool, and by soaping and subsequently souring off the wool assumes a scroop similar to that of silk. Both these methods are frequently applied for the production of so-called "silk-wool", particularly for knitting and hosiery yarns.

The chlorination is carried out in the following manner:

The well wetted or, if necessary, scoured yarn is

1. treated for $^1/_4$ hour in a cold bath containing $1^1/_2$ gallons hydrochloric acid of 35° Tw. per 100 gallons liquor; the yarns are then allowed to drain well or are whizzed lightly and entered without rinsing into
2. a cold bath* prepared with 15—20% chloride of lime of the weight of the goods and titrating about 0,3—0,8 deg. Tw.; in this liquor the goods are turned frequently for $^1/_2$ hour, and are then
3. taken again into the first hydrochloric acid bath (1), where they are treated for about 20 minutes; finally they are rinsed very thoroughly, whereupon they are ready for dyeing.

Should the yellow tone of the wool caused by the chloring process be found objectionable, the yarn is treated finally for

* Preparation of the Chloride of Lime solution: Dry chloride of lime containing 35% of chloride is stirred to a uniform paste with five times its weight of cold water; fifteen times the weight of water is then added, the whole being allowed to settle and the clear solution used.

15 to 20 minutes in a lukewarm bath containing about 1 lb of bisulphite of soda per 10 gallons liquor and then rinsed.

When dyeing it must be remembered that the dyestuffs are much more readily absorbed by chlorinated than by unchlorinated wool. It is therefore advisable to start dyeing without any acid, and to add some acid subsequently, if necessary, for exhausting the bath. It is also recommended to enter the yarn at a somewhat lower temperature than usual.

After dyeing, the yarn is rinsed thoroughly, hydroextracted, and then either soaped and soured off, or soaped only.

Producing a scroopy, silk-like feel:

Treat the chlorinated yarn for 10 minutes in a cold soap bath containing 8 oz olive-oil soap per 10 gallons liquor, sour off lightly with hydrochloric or sulphuric acid, whizz, and dry.

Producing a very soft handle:

Prepare a concentrated cold bath with

$\frac{3}{4}$—1 lb olive-oil soap
$1\frac{1}{2}$—3 oz olive-oil
1 oz ammonia of 0,913 spec. grav.
} per 10 gallons liquor;

after chlorinating as described on page 52, treat the dyed and hydroextracted yarn for 10—15 minutes in this bath, whizz, and dry.

Stoved or "Sulphured" Colours on Wool Yarn.

In order to produce these colours, the yarns are dyed in either a soap or an acid bath, and then stoved.

The sulphured colours are chiefly in demand for Berlin and fancy wools, the favourite shades being cream, greenish yellow to gold, orange, maize, salmon, chamois, pink, Imperial red, lilac, azure, blue and yellowish green (parrot green).

Dyeing pale shades:

Pale shades are always dyed in a soap bath, the following dyestuffs fast to stoving being used:

For cream, light sulphur yellow, maize, salmon and chamois:

Combinations of
Thioflavine T
Rosazeïne B, 13
Irisamine G;

for pale greenish yellows and yellowish greens:

Combinations of
Thioflavine T
Victoria Blue B;

for light pink:

Rosazeïne B, 13
Irisamine G
Rose Bengale extra N (for very bluish shades);

for lilac:

Methyl Violet 3B—6B
Crystal Violet 10B;

for azure:

Victoria Blue B;

for white:

Victoria Blue B (for milk white)
Methyl Violet 3B—6B } for ivory white;
Crystal Violet 10B }

Prepare a soap bath with 3—8 oz curd soap or olive-oil soap per 10 gallons, according to the hardness of the water; add the dyestuff solution, stir well, enter the yarn at 40—45° C (105—115 deg. F.) and work for $^1/_4$ to $^1/_2$ hour. Then lift the yarn, hydroextract evenly but not too severely, leave overnight in the sulphur stove, and finally dry in the open air in a shady place.

White is frequently stoved a second time for a few hours.

Dyeing full, brilliant shades.

Basic and Eosine Colours, as well as Acid Colours, are used for producing such shades. The method of dyeing is the usual one in a bath weakly acidulated with acetic acid or, in the case of Acid Colours, with the addition of bisulphate of soda, or of Glauber's salt and sulphuric acid.

The following dyestuffs possessing very good fastness to stoving come into consideration:

For shades ranging from sulphur yellow to orange:

Combinations of
Thioflavine T
Rosazeïne B, 13
Irisamine G
} Method XIII, page 14,

or with Acid Colours
China Yellow B
Naphtol Yellow S
Acid Yellow AT
Rosazeïne B, 13
} Method I, page 4;

for greenish yellow to yellowish green:

Combinations of
Thioflavine T
New Methylene Blue N, NSS
Victoria Blue B
} Method XIII, page 14,

or with Acid Colours:
China Yellow B
Naphtol Yellow S
Acid Yellow AT
Tetra Cyanole SF
} Method I, page 4;

for medium and dark pinks:

In the first instance:
Rosazeïne B, 13, Method III, page 6;
For less bright shades:
Erythrosine, all brands
Phloxine, all brands
Rose Bengale extra N
} Methode VII, page 8.

For exceedingly brilliant, light reds (Imperial Red):

Rosazeïne B, 13
Eosine, all brands
Erythrosine, all brands
shaded with
Orange extra
Brilliant Scarlet GG, G
Scarlet FR
} Method II or III, pages 5 and 6;

for blue:

Alkaline Blue 6B—3R, Method VI, page 8.
Victoria Blue B, Method XIII, page 14.

for greenish blues: Cyanole FF, Tetra Cyanole SF, extra } Method I, page 4.

After dyeing, rinsing and whizzing, the yarns are stoved overnight in the sulphur stove and then dried in the open air in a shady place.

Note:

When dyeing in a soap bath, it is necessary that the water used be as soft as possible in order to ensure the best results; the use of condensed water is therefore strongly advisable. Hard water must be softened before use.

The dyestuff solution is best filtered through a piece of cotton cloth and added in measured off portions to the dyebath.

Dyeing Loose Wool, Woollen or Worsted Yarns, Cops and Cheeses in Dyeing Machines.

The Dyeing of Loose Wool, Woollen or Worsted Yarns, Cops and Cheeses in Dyeing Machines.

The chief advantage of dyeing loose wool and woollen or worsted yarns in machines is that the goods retain their original softness and are not in the least felted by the dyeing process. The dyeing of wool in the form of cops or cheeses is also gaining steadily in importance, for which purpose machines are used into which the goods are evenly packed, but more particularly machines in which they are dyed on perforated spindles.

In selecting a machine, an important point to be considered is the material of which the machine is constructed. Iron machines for instance are not to be recommended for wool dyeing; best are machines made of wood or copper, with bronze, copper or nickeline fittings, and spindles made of nickeline or nickel.

Special attention has to be paid to the water used for dyeing being pure and soft. If however this is not available in sufficient quantity, it is advisable to soften the water in a suitable manner.

The softening of the water on a small scale is best done in a special vat provided with a delivery cock fixed 4 to 8 inches above the bottom. In proportion to the hardness of the water, 5—10 oz oxalate of ammonia per 100 gallons are added; the water is then stirred well, the precipitate allowed to settle, and the clear water free from lime let off by the cock.

Correction of the water in the dyeing machine is not advisable because the precipitated lime adheres to the goods and these dust when subjected to further operations.

In order to prevent spotty dyeings, it is very important to *dissolve the dyestuff perfectly* before dyeing. Boiling condensed water is best used for dissolving, the solution being added to the liquor through a fine sieve or a piece of cotton cloth.

The Dyeing of Loose Wool in Machines.

When dyeing loose wool in machines, care should be taken that the wool is not packed too tightly; those machines therefore are best suited in which the wool is kept fixed by the weight of loose wooden covers which may perhaps be slightly weighted down.

For dyeing loose wool in machines, the same dyestuffs are suitable which are used for the machine-dyeing of slubbing; thus the products enumerated on pages 40 to 51 are equally suitable for the dyeing of loose wool in machines.

Our *Anthracene Chrome* and *Anthracene Acid Colours* in particular are used for this purpose, answering fully the high requirements for fastness made of wool dyeings generally, and being distinguished by their easy solubility and good levelling properties.

The best *Blacks* for this purpose are the *Anthracene Chrome Black* brands of the "P"series. They yield dyeings answering the highest demands in point of fastness, are easily soluble, level excellently and offer the great advantage of not frothing.

The Dyeing of Woollen and Worsted Yarns in Dyeing Machines.

Yarn is either dyed in the same machines as used for loose wool, or in automatic yarn-dyeing machines. In addition to the economy in labour, steam and water, machine-dyeing offers the considerable advantage that the yarns do not felt in the least. Machine-dyeing has therefore been found especially well adapted for knitting yarns, Berlin wool and woollen yarns, and for yarns generally which are inclined to felt.

In charging the machines special care should be taken to prevent the formation of channels during the dyeing, which may easily cause uneven results.

The yarn is as a rule wetted out, or, if necessary, washed with soda or ammonia and soap before it is dyed or placed into the machine. Boiling is only necessary for yarns which are very apt to curl. Yarns containing little or no grease may be wetted out in the machine proper, or be cleaned with some ammonia.

The same dyestuffs as enumerated on pages 35 to 51 for the dyeing of woollen or worsted yarns in the vat and applied according to the instructions laid down there come into consideration for the dyeing.

Besides the *Chrome Colours*, the *Diamine Colours* are very popular, by reason of their very simple method of application, especially for the production of light compound shades, and for yellows, reds and clarets fast to washing and milling.

For blacks fast to washing on knitting and hosiery yarns, *Naphtylamine Black 4 B*, *6 B* and *BBN* are chiefly used; further, *Alphanol Black BG*, *R*, *Naphtyl Blue Black N* and *Naphtylamine Black RNB* and *NBB*, which are still faster to washing.

For the dyeing of yarns which in point of fastness to washing, milling and potting, etc. are required to meet still higher demands, the various *Anthracene Chrome Black* and *Anthracene Acid Black* brands come into consideration.

The Dyeing of Woollen and Worsted Yarns in the Form of Cops or Cheeses.

Generally speaking the dyestuffs recommended on pages 35 to 51, applied according to the methods mentioned there, come into consideration for the dyeing of these materials both by the packing and by the spindle system.

For the production of mode shades with Acid Colours, *Acid Yellow AT*, *Orange GG*, *Lanafuchsine SG* and *SB*, *Azo Orseille BB*, *Cyanole Fast Green G*, *Cyanole Green B* and *5 G* and *Cyanole Extra* and *FF* are excellently suited, whereas for producing bright dyeings (for effect threads) fast to milling, the following products are used: *Milling Yellow O*, *Milling Red G*, *Wool Red B*, *Rosazeïne B* and *13*, *Formyl Violet* all, brands, *Formyl Blue B*, *Brilliant Milling Blue B*, *Tetra Cyanole A* and *Brilliant Milling Green B*.

The Anthracene Colours answer the most exacting requirements with regard to fastness. They are chromed on cops and cheeses usually in the same bath. Particularly *Anthracene Yellow BN*, *Anthracene Chrome Brown D* and *SWN*, *Anthracene Acid Brown G*, *Anthracene Chrome Red A*, *Anthracene Blue Black C*, *Anthracene Chrome Blue G*, *F*, *BB* are very well adapted for the purpose.

For *Blacks* on fancy yarns, *Naphtylamine Black S*, *ESN*, *ES3B*, *Naphtylamine Blue Black 5B* and *B* are usually employed; for dyeings fast to washing, *Alphanol Black R*, *BG* and *Naphtyl Blue Black N*, while *Anthracene Chrome Black F*, *5B* and the products of the "*P*" *series* serve for dyeing milling goods.

If fastness to rubbing is of special importance, it is recommended to after-chrome the Anthracene Colours in a fresh bath with the addition of $^1/_2$—$1\,^1/_2\,\%$ concentrated hydrochloric acid.

When dyeing in packing machines, particular attention has to be paid to the goods being packed evenly and the interstices being well filled, for which latter purpose loose cotton is mostly used.

Dyeing of Woollen and Worsted Piece-Goods.

The Dyeing of Woollen and Worsted Piece-Goods.

Scouring of Wool Fabrics. Before dyeing, the goods should be very carefully wetted out in hot water. Goods which are not quite clean are wetted by adding to the water 1—2% ammonia of the weight of the material, and removing this again by rinsing thoroughly. Goods which have a tendency to produce skittery effects, or which are apt to yield uneven two-coloured shades, owing to different qualities of wool being used for the manufacture of the piece, are to advantage boiled in water for 1—1½ hours previous to dyeing.

Carbonising of Woollen Goods. Piece-goods are in most cases carbonised just before the dyeing, sometimes also previous to the milling. The carbonising is as a rule done similarly as described on page 17 for loose wool, with sulphuric acid of 6—9 deg. Tw.; in the case of colours which are sensitive to acids and sometimes even for pale, delicate shades, aluminium-choride solutions of 9—12 deg. Tw., or less frequently magnesium chloride solutions of 15 deg. Tw., are used.

The goods are impregnated with the acid etc. in a wooden vat provided with a slowly running winch, for 1—2 hours, according to the thickness of the material, or for a shorter time in the washing machine; they are then evenly whizzed in a hydroextractor which has been well lead-lined or provided with an acid-proof coating, and hereafter carbonised without unnecessary delay. In case it should be impossible to carbonise the pieces at once, it is well to cover them with a cloth soaked in the carbonising liquor in order to protect them from the effect of direct sunlight and air, because dried up patches do not dye so deep as the rest of the material. As particularly the folds or lists in plaited goods have a tendency to dry up, such faults in carbonising as a rule show up in the form of streaks running crossways or lengthways in the material.

The pieces are usually carbonised in stoves specially built of brick-work, through which the goods are run horizontally over a number of wooden guiding rollers. These stoves are heated either by heating apparatus fixed at the bottom of the interior, or with hot air. They contain two chambers; in the first one, which should be provided with an outlet for the moist air and

acid vapours, the pieces are dried at moderate heat, and in the second they are carbonised at 90—110° C. (195—230 deg. F.) or considerably hotter if magnesium chloride be used. Care should be taken that no condensation of water takes place during the drying and carbonising, because drops of water falling on to the goods weaken the same materially, and are apt to cause spots on dyeing. Should a special carbonising stove not be available, the goods are sometimes simply hung up in drying rooms which are well ventilated during the drying process, and are heated strongly, with the ventilating valve closed, for the carbonising proper; another method is to pass the goods several times over drying cylinders which are tinned or, better still, covered with woollen cloth; it is difficult however to make such drying cylinders hot enough to be effective.

If *goods containing cotton selvedges* are to be carbonised, such selvedges, before entering the carbonising stove, are given a coating of silicate of soda of 15° Tw., or of a soda solution thickened with chalk.

After the carbonising, the goods are run for a little while in a dry washing or milling machine in order to grind down the charred burrs and cotton particles and thus remove them from the goods.

The next process is to *neutralise the carbonised goods.* After a short rinsing in water they are usually neutralised with soda or ammonia, and then thoroughly rinsed in water. Pieces which are to be dyed with easily levelling colours or which have been dyed previously, are frequently simply well rinsed in water in the washing machine. In order to remove the fatty handle of goods carbonised with aluminium chloride or magnesium chloride they are first of all washed with a little sulphuric or hydrochloric acid, and then thoroughly washed with fuller's earth with the addition of some soda.

Bleaching of Wool Piece-goods. The goods are bleached in the same manner as described on page 36 for woollen yarn, special care being paid to the pieces being kept well immersed in the liquor.

Dyeing of Wool Pieces. The goods are generally dyed on a winch driven by machinery, and almost exclusively in the rope-form. In case the selvedges roll up, the goods are sewn together in such a manner as to form a sort of hose, which prevents the formation of light selvedges or lists. It is also advisable to dye

worsteds and piece-goods, the surface of which might be impaired by coming into contact with the winch, in hose-form with the wrong side up.

According to the requirements made of the goods, the following classes of colours may be used:

1) Acid Colours,
2) Anthracene Colours,
3) Diamine Colours,
4) Eosine- and some Basic Colours.

Owing to their simple method of application and excellent levelling properties, the *Acid Colours* are the most important for the dyeing of piece-goods. They are of the greatest value for dyeing ladies' dress goods of all kinds, plushes, curtain goods, facings and billiard cloths, and are also most extensively employed for gentlemen's suitings. For producing dyeings fast to washing on flannels, such Acid Colours as *Formyl Violet, Brilliant Milling Blue, Formyl Blue, Tetra Cyanole A, Alkaline Blue, Brilliant Milling Green, Milling Yellow, Milling Red, Wool Red and Rosazeine B and 13 are chiefly used*, these colours being distinguished by their excellent fastness to washing.

With regard to fastness to rubbing, steaming, alkalies, perspiration and hot pressing, the Acid Colours in general satisfy normal demands. In the case of very high requirements with respect to fastness to light, alkalies and perspiration, or if the goods are to be subjected to a milling process after dyeing, our Anthracene Colours (Chrome Colours) are employed. They are especially important for better-class gentlemen's suitings, uniform and livery cloths.

The Diamine Colours are extensively used for producing colours fast to washing on flannel and hosiery goods.

The Eosine and Basic Colours serve for dyeing bright, cheap pink and red shades on flannel and low-class blanket materials.

Dark, coloured shoddy goods are principally used for deep shades and blacks. If they are to be dyed to bright, pale shades, they must be stripped previously, as described in the chapter on Shoddy.

Cheapest method of production

Combinations of
*Naphtol Yellow S
Indian Yellow FF
Orange II, extra
*Azo Orseille BB
(for pale shades)
*Lanafuchsine SB, SG
*Naphtol Red C
(only for browns)
*Indigo Blue N

Method I, page 4.

For prune shades:

Combinations of
Orange II, extra
*Azo Wool Violet 7R
*Naphtol Red C
*Indigo Blue N

Method I, page 4.

Of better fastness to light

Combinations of
*Acid Yellow AT
Tropaeoline OO, O
*Orange GG
Orange extra, II, IV
*Azo Orseille BB
(for pale shades)
*Lanafuchsine SB, SG
Cyanole Green B, 6G
*Tetra Cyanole V

Method I, page 4.

Shades still faster to light, alkalies and perspiration are obtained with
*Acid Yellow AT
*Orange GG
*Lanafuchsine SG
*Cyanole Fast Green G

Method I, page 4.

Combinations of the last named dyestuffs are also very well adapted for dyeing gentlemen's suitings containing cotton effect threads.

For prune shades:

Combinations of
*Orange
*Azo Wool Violet 7R
*Tetra Cyanole V

Method I, page 4.

The dyestuff marked with an asterisk (*) do not stain

For dyeing woollen and worsted pieces containing

For ladies' materials:

Acid Yellow AT
Naphtol Yellow S
Orange GG
Lanafuchsine SG
Azo Wool Blue C
Cyanole extra

Method see under "Wool and Silk".

For particulars of fastness to steaming, carbonising

Browns on Woollen and Worsted Piece-Goods.

Of very good fastness to washing

Combinations of

*Milling Yellow O, OO
*Milling Red G
Wool Red B
*Brilliant Milling Green B
*Formyl Violet S 4 B
(for prune shades)

} Method III, page 6.

or

Diamine Yellow CP
Diamine Brown M, R
Oxy Diamine Brown G
Diamine Catechine G
Diamine Scarlet B, 3B
Diamine Rose BD
Diaminogene extra
Oxy Diamine Violet B
(for prune shades)

} Method XII, page 13.

Exceedingly fast to light and washing

Combinations of

*Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chrome Brown D, DW, *SWN
*Anthracene Chrome Red A
Anthracene Blue Black C
*Anthracene Chrome Blue F, R
Anthracene Chrome Blue G, BB
*Anthracene Chrome Violet B

} Method VIII or X, pages 9 and 11.

For brown and prune, combinations of

Anthracene Chrome Brown DWN
Anthracene Acid Brown G, N, B, V
*Anthracene Yellow BN
*Anthracene Chrome Red A
*Anthracene Chrome Blue F, R
*Anthracene Chrome Blue G, BB
*Anthracene Chrome Violet B

} Method IX or X, pages 10 and 11.

or

*Anthracene Chromate Brown EB, 3G
Alphanol Blue BR extra
*Anthracene Yellow BN
Anthracene Blue Black C
Wool Red B

} Method XI, page 12.

effect threads of cotton, China-grass or artificial silk.

white silk shots, the following dyestuffs may be used:

For gentlemen's suitings:

Anthracene Yellow BN
Anthracene Chrome Violet B
Anthracene Chrome Blue F

} for method see page 91.

and stoving of the above-mentioned dyestuffs see pages 80 to 82.

Cheapest method of production

Yellow.

For bright yellows:

*Naphtol Yellow I, *China Yellow B — Method I, page 4.

For deep yellows:

Indian Yellow, Indian Yellow G — Method I, page 4.

Orange.

Orange II, extra, Orange R — Method I, page 4.

For very bright oranges:

Combinations of

*Naphtol Yellow S, *Rosazeïne B, 13 — Method I, page 4.

Pink.

Diamond Magenta Ia, Magenta yellow shade — Method XIII, page 14.

For bright pinks:

*Eosine 3G, GGF, L, BN
*Eosine Scarlet B
*Erythrosine yellow shade, D, B, extra N
*Phloxine S
*Rose Bengale extra N

— Method VII, page 8.

Of better fastness to light

Yellow.

For bright yellows:

*Acid Yellow AT, *Fast Yellow S — Method I, page 4.

For deep yellows:

Indian Yellow FF, R
Metanil Yellow
Tropaeoline O, OO, G
Orange IV

— Method I, page 4.

Orange.

*Orange GG, Orange EN, ENZ — Method I, page 4.

For very bright oranges:

Combinations of

*Acid Yellow AT
*Fast Yellow S
*Rosazeïne B, 13

— Method I, page 4.

Pink.

*Rosazeïne B, 13
Method III or I, page 4 or 6.

*Lanafuchsine SG, *Lanafuchsine SB — Method I, page 4.

The dyestuffs marked with an asterisk (*) do not stain (Rosazeïne is satisfactory in this

For dyeing woollen and worsted pieces with

Naphtol Yellow S, Fast Yellow S, Acid Yellow AT, Orange GG — Method see under "Wool and Silk".

For particulars of fastness to steaming, carbonising and stoving of the above-

Shades on Woollen and Worsted Piece-Goods.

Of very good fastness to washing

Yellow.

*Milling Yellow O, OO, Method III, page 6.
or
Thioflavine S
Oxy Diamine Yellow TZ } Method XII, page 13.
Diamine Fast Yellow FF
Diamine Yellow CP

Orange.

Combinations of
*Milling Yellow O, OO } Method III, page 6.
*Milling Red G

For very bright oranges:

*Milling Yellow O, OO } Method III, page 6.
*Rosazeïne B, 13

Of still better fastness to washing:
Oxy Diamine Orange G, R
Diamine Orange B, F
or combinations of
Diamine Yellow CP
Diamine Scarlet B
*Rosazeïne B, 13
(for brightening)
} Method XII, page 13.

Pink.

*Rosazeïne B, 13, Method III, p. 6.
*Eosine Colours, (see column 1) Method VII, page 8.
Of still better fastness to washing:
Diamine Rose BD, GD
Diamine Scarlet B, 3B
Rosazeïne B, 13
(for brightening).
} Method XII, page 13.

Exceedingly fast to light and washing

Yellow.

*Milling Yellow O, OO
Method III, page 6.
*Anthracene Yellow BN
Anthracene Yellow C
Anthracene Yellow R
} Method IX or X, page 10 or 11.

Milling Yellow O and OO amongst others are used frequently for dyeing yellow cloth for uniform facings and bunting (flags).

For greenish yellow:

Anthracene Yellow GG, after-treated with chromium fluoride (Method IX), or on chromed wool, (Method X), pages 10 and 11.

Orange.

Combinations of
*Anthracene Yellow BN
Anthracene Yellow C
Anthracene Yellow R
Diamine Fast Red F
} Method IX or X, pages 10 and 11;
further:
*Milling Yellow O, OO
Diamine Scarlet B
} Method XII, p. 12.

The combination of Milling Yellow and Diamine Scarlet is largely used for the dyeing of orange cloth for facings for military and postal uniforms.

effect threads of cotton, China-grass or artificial silk.
respect for pale shades only).

with white silk shots, the following may be used:

Brilliant Scarlet 4R, 6R
Lanafuchsine SG, SB
Eosine 3G, BN
Eosine Scarlet B
} Method see under "Wool and Silk".

mentioned dyestuffs see pages 80 to 82.

Cheapest method of production	Of better fastness to light

Red and Claret.

*Brilliant Scarlet, all brands *Crystal Scarlet 6R *Scarlet FR, F2R, F3R *Brilliant Cochineal RR, 4R Scarlet EC, Roccelline *Naphtol Red EB, C *Amaranth, *Azo Red A — Method II, page 5.	Brilliant Croceïne R Brilliant Croceïne B Brilliant Croceïne M Brilliant Croceïne 2B Brilliant Croceïne 3B Brilliant Croceïne 5B *Brilliant Croceïne 6B *Brilliant Croceïne 7B *Brilliant Croceïne 9B Croceïne AZ *Azo Rubine A — Method II, page 5;
*Lanafuchsine SB, SG *Azo Orseille BB *Acid Magenta — Method I, page 4.	for brighter clarets: *Lanafuchsine 6B — Method I, page 4.
Combinations of *Rosazeïne B, 13 Orange extra, R *Naphtol Yellow S for very fiery reds — Method I, page 4.	

Violet.

Acid Violet *6BS, 6BC, *4RS — Method I, page 4.	*Azo Wool Violet 7R, 4R — Method I, page 4.
Of excellent fastness to alkalies: *Formyl Violet S4B, S5B, 6B, 8B, 10B — Methods II or III, p. 5 and 6.	For violet shades exceedingly fast to light: *Lanacyl Violet B, — Method III, page 6.

Suitable shading products:

*Cyanole extra, FF	*Orange GG
*Tetra Cyanole extra, V	Orange II, extra
*Cyanole Fast Green G	*Acid Yellow AT

The dyestuffs marked with an asterisk (*) do not stain effect

For dyeing woollen and worsted pieces with

Crystal Scarlet 6R	Lanafuchsine SG, SB, 6B
Brilliant Scarlet 4R, 6R	Naphtol Red C
Scarlet FR, F3R	Amaranth
Brilliant Cochineal 2R	Acid Magenta (for pale shades).

For particulars of fastness to steaming, carbonising, and stoving

Shades on Woollen and Worsted Piece-Goods.

Of very good fastness to washing	Exceedingly fast to light and washing
Red and Claret.	
*Milling Red G, FR Wool Red B, BG shaded if necessary with *Rosazeïne B, 13 *Formyl Violet S4B *Milling Yellow O — Method III, page 6.	Diamine Fast Red F, chromed, shaded if necessary with *Milling Yellow O, OO *Anthracene Yellow BN Wool Red B — Method XII, page 13. or combinations of Diamine Fast Red F *Anthracene Chrome Violet B *Anthracene Chrome Blue FR, F, R *Formyl Violet S4B (for brightening) — Method IX, page 10.
further: Diamine Scarlet B, 3B Diamine Purpurine B, 3B, 6B Diamine Bordeaux S, B Diamine Brilliant Bordeaux R shaded if necessary with Oxy Diamine Violet B Diamine Yellow CP — Method XII, p. 13.	For dull Clarets: *Anthracene Chrome Red A shaded if necessary with *Anthracene Chrome Violet B — Methods VIII or X, p. 9 & 11.
The following are also used frequently for dyeing flannels fast to washing: *Scarlet EC, FR, F2R, F3R *Crystal Scarlet 6R — Method II, page 5.	
Violet.	
*Formyl Violet, all brands Alkaline Violet CA, C shaded if necessary with *Brilliant Milling Blue *Formyl Blue B [B — Method III, for Formyl Violet also Method II, pages 5 and 6.	*Anthracene Chrome Violet B shaded if necessary with *Anthracene Chrome Blue R, F for brightening: *Formyl Violet S4B *Brilliant Milling Blue B — Methods VIII or X, pages 9 & 11.

threads of cotton, China-grass or artificial silk.

white silk shots, the following may be used:

Azo Wool Violet 7R
Acid Yellow AT
Azo Wool Blue C
Cyanole FF
(for bright pale shades)
— Method see under "Wool and Silk".

of the above-mentioned dyestuffs see pages 80 to 82.

Cheapest method of production

For bright blues:

*Cyanole FF, extra, AB
*Tetra Cyanole V, SF, extra
*Indigo Blue N, SGN
*Acid Violet 6BS

Method I, page 4.

For navy and dark blues:

*Azo Wool Blue SE, SER
*Azo Navy Blue B, 3B
*Acid Navy Blue A
*Brilliant Naphtol Blue 4B, B, shaded with R
*Azo Wool Violet 4B, 7R
*Acid Violet 6BS
*Orange GG
*Cyanole Green B, 6G or saddened with
*Azo Merino Black 8B, 6B further

Method I, page 4.

Formyl Violet S4B—10B
Water Blue B, R, RB
Wool Blue TB
Solid Blue R, 3B
Lanacyl Navy Blue B, BB
Lanacyl Blue R
Lanacyl Violet B in combination with logwood

Method on page 88.

Of better fastness to light

For bright blues:

Alkaline Blue, all brands shaded with Alkaline Violet C, CA

Method VI, page 8.

For navy and dark blues:

*Lanacyl Navy Blue BB, B
*Lanacyl Blue BB, R
*Azo Merino Blue 3B, G
*Azo Merino Dark Blue R
Naphtol Blue G, R

Method III, pages 6 and 82.

Of excellent fastness to light:

*Peri Wool Blue B, BG, G
Method II, page 5.
*Lanacyl Violet
Method III, page 6.

For dark blues very fast to alkalies and perspiration on cloth for riding breeches, liveries etc.

Naphtyl Blue Black N shaded with Lanacyl Violet B Tetra Cyanole V, A

Method IV, page 7.

For very cheap navy and dark blues, so-called "Brilliant Blues":

*Naphtol Black 3B, 6B
*Naphtylamine Blue Black 5B, B, BD
*Naphtylamine Black ES8B, ES5B, ES3B, shaded with
*Formyl Violet S4B—10B
*Brilliant Milling Blue B

Method III, page 6.

The dyestuffs marked with an asterisk (*) do not stain effect threads

For dyeing woollen and worsted pieces with

For ladies' dress goods:

Cyanole FF, extra (for light and medium blues)
Azo Wool Blue C
Azo Wool Violet 7R
Lanafuchsine 6B
Orange GG

for Method see under "Wool and Silk"

For particulars of fastness to steaming, carbonising and stoving of

Of very good fastness to washing

For bright blues:

Alkaline Blue, all brands shaded with Alkaline Violet CA, C — Method VI, page 8.

or

*Brilliant Milling Blue B
*Formyl Blue B
*Thiocarmine R
*Tetra Cyanole A shaded with
*Formyl Violet S4B
*Brilliant Milling Green B

Method III, for Thiocarmine and Tetra Cyanole also Method I, pages 4 and 6 respectively.

The Alkaline Blue dyeings must be soured off after the alkaline washing.

For navy and dark blues:

Combinations of
*Brilliant Milling Green B
*Brilliant Milling Blue B
Wool Red B, *Orange GG
*Formyl Violet S4B
(for brightening)

Method III, page 6.

or, of still better fastness to washing:

*Anthracene Acid Black SBB
Anthracene Chrome Black 5B
*Formyl Violet S4B—10B
*Brilliant Milling Blue B
*Formyl Blue B

Method IX, page 10.

For most purposes the following prove satisfactory:

Combinations of
*Cyanole Fast Green G
*Lanafuchsine 6B
*Orange GG
*Formyl Violet S4B
(for brightening)

Method I, page 4.

Exceedingly fast to light and washing

Anthracene Chrome Blue BW extra
*RRW extra, Method X, page 11.
Anthracene Chrome Blue *F, G, BB, *B, *R — Meth. X or VIII, pages 11 and 9.
*Anthracene Chrome Blue FR
*Anthr. Acid Blue BBN, BB, 3B
Methods IX or X, pages 10 & 11.
Anthracene Acid Blue RT
Method IX, page 10.
*Alphanol Blue BR extra
Method V, page 8.

For very cheap blues:

*Azo Chrome Blue T, TB,
Method VIII, page 9.

For specially bright blues:

Anthracene Chrome Blue FD
Anthracene Acid Blue *GG, RR,
Method X, page 11.

Suitable shading products:

*Brilliant Milling Blue B
*Formyl Blue B
*Tetra Cyanole A
*Formyl Violet S4B—10B
*Brilliant Milling Green B

for bright blues,

Anthracene Acid Black DSF
(for dyeings on chromed goods)
Anthracene Acid Black SBB, *SR
(for one-bath dyeings)

for very deep dark blues

For blues fast to potting principally:

Anthracene Chrome Blue *F, *FR, G, BB — Methods X or VIII, pages 9 or 11 respectively.

of cotton, China-grass or artificial silk.

white silk shots, the following may be used:

For gentlemen's suitings:

Dark Blue WS
Lanacyl Blue BB, R
Lanacyl Violet B

for shading — Method see page 92.

Anthracene Chrome Blue F
Anthracene Chrome Violet B

See page 93.

the above-mentioned dyestuffs see pages 80 to 82.

Cheapest method of production	Of better fastness to light
*Acid Green extra conc. *Fast Acid Green B, BN *Indigo Blue N in combination with *Naphtol Yellow S Indian Yellow FF Tropaeoline OO, O Orange IV, II, extra, R *Lanafuchsine SG *Azo Wool Blue SE (for saddening) } Method I, page 4.	Combinations of *Cyanole Green B, 6G *Acid Yellow AT, Indian Yellow FF Orange IV, II, extra, R *Lanafuchsine SG *Azo Wool Blue SE (for saddening) } Method I, p. 4 Naphtol Dark Green G shaded with the before mentioned dyestuffs } Method II, page 5. Still faster to light, alkalies and perspiration, and preferable for dyeing gentlemen's suitings containing cotton effect threads: *Cyanole Fast Green G *Acid Yellow AT, *Orange GG *Lanafuchsine SG *Peri Wool Blue G, (for saddening) Method I, page 4.
For bright greens:	Very fast to light:
*Acid Green extra conc. *Acid Green extra conc. B *Acid Green 5G *Fast Acid Green BN *Fast Acid Green B shaded with *Naphtol Yellow S *Tetra Cyanole V } Method I, page 4.	Naphtol Green B shaded with *Acid Yellow AT *Lanafuchsine SG *Peri Wool Blue G *Cyanole Fast Green G } Method II, page 5.
	For bright greens fast to alkalies (Bjilliard Greens):
	Cyanole Fast Green G shaded with *Acid Yellow AT } Method I, page 1.

The dyestuffs marked with an asterisk (*) do not stain effect threads

For dyeing woollen and worsted pieces with

For ladies' dress goods:

Acid Yellow AT	Acid Green extra conc.	in pale shades
Naphtol Yellow S	Acid Green 5G	
Orange GG	Naphtol Green B	
Lanafuchsine SG	Azo Wool Blue C	

For Method see under "Wool and Silk".

For particulars of fastness to steaming, carbonising and stoving of the above-

Of very good fastness to washing	Exceedingly fast to light and washing
Combinations of *Brilliant Milling Green B *Milling Yellow O, OO *Milling Red G Wool Red BG *Formyl Blue B *Tetra Cyanole A — Method III, page 6.	Combinations of *Anthracene Chrome Blue F Anthracene Chrome Blue G, BB Anthracene Blue Black C *Cyanole Fast Green G (for brightening) *Anthracene Yellow BN Anthracene Acid Brown G Anthracene Chrome Brown D, DW, *SWN *Anthracene Chrome Red A — Methods VIII or X, pages 9 and 11.
For bright greens: *Cyanole Fast Green G *Brilliant Milling Green B shaded with *Milling Yellow O, OO — Method III, page 6.	or such of *Anthracene Chromate Green B *Alphanol Blue BR extra Anthracene Blue Black C *Cyanole Fast Green G (for brightening) *Anthracene Yellow BN Anthracene Chromate Brown 3G, EB — Method XI, page 12.
The following prove satisfactory for many purposes: *Cyanole Fast Green G shaded with Tropaeoline O *Acid Yellow AT — Method I, page 4.	Green for Military, Police, Customs and other Uniforms: Combinations of *Anthracene Yellow BN Anthracene Chrome Blue G *Cyanole Fast Green G for brightening) *Brilliant Milling Green B (for brightening) — Method X, for very deep shades likewise VIII, pages 9 and 10.
Brilliant Milling Green and Cyanole Fast Green are frequently used for the dyeing of green cloths for uniform facings, etc., and are treated with tannin in order to produce better fastness to water (see page 82).	

of cotton, China-grass or artificial silk.

white silk shots, the following may be used:

For gentlemen's suiting:

Anthracene Chrome Blue F
Anthracene Yellow BN
Anthracene Chrome Violet B — for Method of dyeing see page 91.

mentioned dyestuffs see pages 80 to 82.

Direct Blacks of very good fastness to light and normal fastness to alkalies and perspiration

A. For plain goods

For blacks with a bluish cast:

Naphtylamine Black, 4B, 6B, Method III, page 6.

Naphtylamine Black, S, ES8B, ES5B, ES3B, 7BS, 4BS, SGG — Meth. II, p. 5.

Naphtylamine Blue Black 5B — Meth. II, p. 5.

Naphtol Black 6B, 3B — Meth. II, p. 5.

For dense blacks:

Naphtylamine Black X2B, X3B, OO — Method III, page 6.

Naphtylamine Black ESN, ESS, T, TJ, TN, SS2B, SS3B — Meth. II, page 5.

Naphtylamine Blue Black B, BD — Meth. II, page 5.

Naphtol Black 2B, B, SG, M — Meth. II, page 5.

The following level especially well:

Azo Merino Black 8B, 6B, 6BE, B, BE and are used especially for cashmere and other light goods. Method I, page 4.

For specially cheap blacks:

Naphtyl Blue Black N — see page 85.

Naphtylamine Black 19J, 4B, 6B, 7BS, ESN, X2B, X3B — see page 85.

Naphtyl Blue Black 5B, B, BD — see page 85.

with Logwood and Fustic.

Shading products:

The same as are stated in column 2 of this page, and in addition thereto for jet blacks:

Tropaeoline OO, O, Indian Yellow

Orange II, extra. [FF

B For goods containing effect threads

For blacks with a bluish cast:

Naphtylamine Black EFF (effect threads are not stained at all) — Method II, page 5.

Naphtylamine Black S, ES8B, ES5B, ES3B, 7BS, 4BS, SGG — Method II, page 5.

Naphtylamine Blue Black 5B — Method II, page 5.

Naphtol Black 6B, 3B — Method II, page 5.

For dense blacks:

Naphtylamine Black ESN, ESS, T, TJ, TN, SS2B, SS3B, SOO — Method II, p. 5.

Naphtylamine Blue Black B, BD — Method II, p. 5.

Naphtol Black 2B, B, SG — Method II, p. 5.

For ladies' dress goods containing effect threads, the following are very extensively used:

For blue-black: Azo Merino Black 8B, 6B, 6BE

For jet black: Azo Merino Black B, BE — Method I, page 4.

Shading products:

For blue-black:

Acid Violet 6BS, Tetra Cyanole V

Cyanole Green B, 6G, Acid Green.

For jet blacks:

Acid Yellow AT, Orange GG.

For dyeing woollen and worsted pieces with

For ladies' dress goods:

Naphtylamine Black EFF shaded with Azo Wool Violet 7R, Orange GG, Acid Yellow AT — For Method see under "Wool and Silk".

For particulars of fastness to steaming, carbonising and stoving

Blacks of very goods fastness to light, alkalies and perspiration

A. For plain goods

Anthracene Chrome Black 5B, F, FE, P extra, PPN extra PFBextra, PFBB extra, PFR extra
Anthracene Acid Black DSF, DSN, DSFB, DNG
→ Method IX, page 10.

Anthracene Acid Black SR, SBB, Method VIII, page 9.

Alphanol Black BG, R
Method III, page 6.

Naphtyl Blue Black N
Naphtylamine Black R
→ Method VI, page 7.

As a substitute for Logwood-iron black on fine qualities of gentlemen's dress suitings, etc.:

Naphtyl Blue Black N in combination with sumac extract
→ Method on page 7.

The Anthracene Chrome Blacks, and in particular the 5B and P extra brands, withstand the potting process very well.

Naphtyl Blue Black N and Naphtylamine Black R also prove satisfactory for many purposes, if some acetic acid be added to the potting liquor.

Shading products:

for blue-black:
Formyl Violet S4B—10B
Brilliant Milling Blue B
Formyl Blue B
Brilliant Milling Green B

and in addition thereto for Anthracene Colours:

Anthracene Chrome Blue FR, F, B
Anthracene Acid Blue BBN
Anthracene Yellow BN
Anthracene Acid Brown G; further, for Naphtyl Blue Black and Naphtylamine Black R,
Anthracene Yellow C

B. For goods containing effect threads

Naphtylamine Black CrN
Naphtylamine Black Cr.
Of still better fastness to alkalies and perspiration:
Anthracene Acid Black SRT
Anthracene Acid Black SR
→ Method VIII, page 9.

If the requirements are very exacting:

Anthracene Acid Black ST, Method IX, page 10.

Anthracene Acid Black ST is also used extensively for union linings (Italians, serges etc.) containing a fast black warp and white or coloured effect threads.

Suitable shading products.

For blue-black:

Formyl Violet S4B—10B
Brilliant Milling Blue B
Formyl Blue B
Brilliant Milling Green B
Anthracene Chrome Blue FR, F
(for dyeings especially fast to light.)

For jet black:

Anthracene Yellow BN.

white silk shots, the following may be used:

For gentlemen's suitings:

Anthracene Acid Black ST shaded with Lanacyl Violet B
→ for Method of dyeing see page 93.

of the above-mentioned dyestuffs see pages 80 to 82.

Special Properties of Fastness of the Dyestuffs mentioned in the Tables on Pages 68 to 79.

Dyestuffs fast to steaming:

All the dyestuffs enumerated possess an excellent fastness to steaming, with the exception of the following, which slightly change their shade on severe steaming, but withstand a normal steaming quite well:

Scarlet EC
Brilliant Croceïne, all brands
Croceïne AZ
Eosine BN
Eosine Scarlet B
Erythrosine, all brands
Rose Bengale extra N
Acid Violet 4RS
Lanacyl Violet B
Lanacyl Blue BB, R
Peri Wool Blue B, BG
Alphanol Blue BR extra
Naphtol Green B
Alphanol Black B, BG, R
Naphtylamine Black 4B, 6B, X2B, X3B, OO, 19J
Naphtyl Blue Black N, Naphtylamine Black R } dyed without an addition of sulphate of copper
Anthracene Acid Black DSF, DSN, DSFB
Oxy Diamine Yellow TZ
Diamine Catechine G
Diamine Brown R
Oxy Diamine Brown G
Diaminogene extra.

Dyestuffs fast to carbonising:

All the dyestuffs mentioned, with the exception of

Azo Orseille BB
Lanafuchsine 6B, Naphtol Red C, Amaranth, Brilliant Orseille C, Azo Wool Violet 7R } change slightly to the blue side but prove satisfactory for most purposes
Acid Violet 4RS
Lanacyl Blue BB, R
Peri Wool Blue, Water Blue, Alkaline Blue } all brands
Naphtyl Blue Black N
Naphtylamine Black R
Eosine, all brands
Irisamine G
Diamond Magenta
Magenta yellow shade
Oxy Diamine Yellow TZ
Oxy Diamine Orange G, R
Oxy Diamine Brown G
Diamine Brilliant Bordeaux G
All combinations with Logwood.

Dyeings produced with the following dyestuffs must be well neutralised after carbonising:

Fast Yellow S
Metanil Yellow
Tropaeoline OO, G
Orange IV
Azo Merino Black, all brands
Diamine Brown R
Diamine Purpurine B, 3B, 6B
Diamine Red 4B, 6B, 10B
Diamine Bordeaux B.

Dyestuffs fast to stoving:

All the dyestuffs mentioned, with the exception of

Fast Yellow S
Scarlet EC
Brilliant Scarlet R—4R
Brilliant Croceïne, all brands
Croceïne AZ
Acid Magenta
Naphtol Red C, EB
Wool Red B, BG
Milling Red FR
Acid Violet 4RS
Formyl Violet 8B, 10B
Lanacyl Violet B
Indigo Blue N, SGN
Peri Wool Blue, all brands
Lanacyl Blue BB, R
Lanacyl Navy Blue, all brands
Alphanol Blue BR extra
Water Blue, all brands
Wool Blue TB
Thiocarmine R
Acid Green, all brands
Fast Acid Green BN, B
Naphtylamine Black 4B, 6B, X2B, X3B, OO, R
Alphanol Black B, BG, R
Naphtyl Blue Black, all brands
All combinations with Logwood
Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chromate Brown 3G
Oxy Diamine Orange G, R
Oxy Diamine Brown G
Diamine Brown R
Diamine Scarlet B
Diamine Bordeaux B
Diaminogene extra.

The following are fairly fast to stoving and sufficient for most purposes:

Tropaeoline, all brands
Metanil Yellow
Orange IV
Crystal Scarlet 6R
Brilliant Scarlet 6R
Roccelline
Milling Red G
Formyl Violet 6B
Naphtol Green B
Anthracene Yellow C, R, GG
Anthracene Chrome Brown SWN, DWN
Anthracene Chromate Brown EB
Anthracene Acid Black DSF, DSN, DSFB
Diamine Orange B
Diamine Catechine G
Diamine Brown 3G

Naphtylamine Black ES 8 B,
ES 5 B, ES 3 B, ESN, ESS
Naphtylamine Blue Black B, BD
Diamine Scarlet 3 B
Diamine Red 4 B, 6 B
Diamond Magenta Ia
Magenta yellow shade.

Increasing the Fastness to Perspiration and Steaming.

a) By a treatment with sulphate of copper.

The fastness to perspiration and steaming of
Naphtyl Blue Black N, FB, FBB
Naphtylamine Black R, RNB, NBB
is very considerably enhanced by a treatment of the dyed material with sulphate of copper in the exhausted dyebath, according to Method IV, page 7.

b) By a treatment with formaldehyde.

The fastness to steaming and especially to perspiration of
Lanacyl Blue BB, R
is considerably increased by a treatment with formaldehyde.

The goods are dyed according to Method III, page 6, with the addition of Glauber's salt and acetic acid, adding after $^3/_4$ hour's boiling

2—3 % formaldehyde of 40 %

to the dyebath and boiling for another $^1/_2$ hour.

Increasing the Fastness to Water by a subsequent Treatment with Tannic Acid.

The fastness to water of most dyestuffs is considerably improved by a simple treatment of the dyed goods with tannic acid.

A treatment of this kind is particularly important for dyeings on cloth for facings (for instance greens dyed with Brilliant Milling Green or Cyanole Fast Green) and for bunting.

The method of working is as follows:

The dyed and rinsed goods are treated for 20—30 minutes in a short bath heated to 30° C. (85 deg. F.) containing 8 oz pure tannic acid per 10 gallons liquor, and then hydroextracted and dried without rinsing.

The shade is not changed at all or only very slightly. For bright shades it is advisable to use a very pure quality of tannic acid.

Correcting of defectively dyed Pieces.

Goods dyed with Acid Colours.

Goods which have been dyed too deep a shade are stripped by boiling for 30 to 40 minutes in a fresh liquor charged with 10—20 % Glauber's salt crystals, or, with 5—10 % acetate of ammonia*, to which 1 % ammonia (liquor of ammonia) may be added; they are then rinsed, and dyed to shade in a fresh acid bath.

Goods which have been dyed too deep a shade with levelling colours are frequently stripped by boiling for some time in water together with a white piece.

Pieces with an uneven or mottled appearance, or pieces which are insufficiently dyed through, are often corrected by adding a large quantity of Glauber's salt to the old dyebath and boiling hard for 1/2 to 3/4 hour. Should this not produce satisfactory results, the goods are best stripped by boiling for 1/2 hour in a fresh bath charged with

10 % acetate of ammonia* and
1 % ammonia

and then causing the pieces to absorb the stripped colour again by adding some acid.

If these methods do not yield the desired effect, it is best to strip the material with Hyraldite**.

The stripping with Hyraldite is carried out in a clean wooden vat, the steam pipe of which is wrapped round with a piece of cotton cloth. Prepare a short lukewarm bath with

1 1/2—4 % Hyraldite Z for Stripping
2 1/2—5 % formic acid 85 %
or
1/2—5 % Hyraldite C extra and
4—10 % acetic acid 30 %

} of the weight of the goods, and according to the depth of shade and the resistance of the dyeings to such a treatment;

enter the goods to be stripped at once, heat in about 1/2 hour to the boil, and continue boiling according to necessity for 10 to 20 minutes. Then rinse first in cold and then in hot water, and re-dye.

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* For preparation of acetate of ammonia see foot-note on page 8.

** Hyraldite must always be stored in well-closed receptacles kept in a cool, dry place. Hyraldite C extra is dissolved before use in warm water, whereas Hyraldite Z for Stripping is added in the dry state straight to the stripping bath.

Goods dyed with Chrome Colours or Diamine Colours.

The most suitable stripping agent for Chrome or Diamine Colours is Hyraldite, ammonia or acetate of ammonia but rarely yielding satisfactory results. The method of working is the same as stated overleaf.

Dyeing of Vegetable Impurities.

(Burls, burrs, threads, straw, etc.)

If only a few burls or burrs are noticeable after dyeing, they are removed by means of the burling iron in the usual manner: in dark coloured goods the burls, etc. are stained with burling ink.

For goods containing large quantities of burls, such a proceeding is however impracticable; such goods must then either be carbonised, or, better still, burl-dyed with Diamine Colours.

Most of our dyestuffs withstand subsequent carbonising very well, as is indicated in the tables on pages 80 and 81. If, after dyeing, the goods are neutralised with soda or ammonia, the last rinsing bath is acidulated to advantage with some acetic or formic acid.

Burl-dyeing with Diamine Colours is exceedingly simple and is carried out in the washing machine after the rinsing of the dyed goods.

The following dyestuffs come into consideration for this purpose:

Diamine Black RMW
(for deep shades and blacks)
Diamine Black BH
Diamine Sky Blue FF
Diamine Blue 2B, 3B
Diamine Fast Blue, FFB
Diamine Fast Yellow A
Diamine Orange G, D
Diamine Nitrazol Brown B, G
Diamine Brown S
Diamine Heliotrope B
Oxy Diamine Violet B
Diamine Rose BD, BG
Direct Rose T
Diamine Purpurine 6B
Diamine Red 10B.

Method of Dyeing.

The pieces dyed in an acid bath are thoroughly rinsed; then a cold bath, as short as possible, is prepared in the washing machine itself, charged according to the depth of shade with

$^3/_4$ oz soda ash
1—2 lbs desiccated Glauber's salt
$^1/_4$—3 oz Diamine Colour
} per 10 gallons liquor.

The goods are worked in this bath for 20 to 40 minutes and again rinsed. The last rinsing bath is to advantage heated a little and acidulated slightly with acetic or formic acid. Goods containing very hard cotton burls are best left lying unrinsed over night, being finished off the following morning as indicated above.

Naphtyl Blue Black and Naphtylamine Black in Combination with Logwood and Sumac.

Logwood Combination (so-called Combination-Black.)

The combination of Naphtyl Blue Black or Naphtylamine Black with Logwood is extensively used, especially for piece-goods, yielding very fine bluish blacks at a low cost which offer over the Logwood dyeings the advantage of very much better fastness to light and acids. For deep blacks, Fustic extract is used for saddening, as the case may demand.

The following dyestuffs are best suited for Combination-Black:

Naphtyl Blue Black N
Naphtylamine Black 19J, 4B, 6B, ESN
Naphtylamine Blue Black B, BD
} for bluish blacks, and saddened with Fustic for jet blacks,

Naphtylamine Blue Black 5B
Naphtylamine Black 7BS
} for bright bluish blacks,

Naphtylamine Black X2B
Naphtylamine Black X3B
} for particularly cheap blacks.

Naphtyl Blue Black N, Naphtylamine Black 7BS, ESN and the Naphtylamine Blue Black brands yield the best dyeings in point of fastness to light.

Method of Dyeing.

Charge the bath with

2— 3 % oxalic acid (according to the hardness of the water) and
10—20 % Glauber's salt crystals,

add the requisite quantity of dyestuff and Logwood extract or Hematine crystals, if necessary some Fustic extract also, and boil up the bath. Enter the well wetted goods, and work for 20 to 30 minutes without steam, then for about 1 hour at the boil. If by this time the bath has not assumed a yellowish brown colour (an indication that the black dyestuff has not yet all been absorbed), boiling is continued for another 15 to 20 minutes with the addition of $^1/_2$—1 % oxalic acid. Then add

4 % sulphate of iron and
4 % sulphate of copper

and boil for another $^3/_4$ hour.

After dyeing, rinse very thoroughly, or, if necessary, wash with fuller's earth and some acetic acid.

Another method of working employed in some dye-houses, which yields however dyeings of not quite such good fastness to light, is as follows:

Charge the dyebath first with

4—6 % sulphate of iron
2—3 % sulphate of copper
Logwood extract or Hematine crystals,
and, if necessary, Fustic extract;

then add oxalic acid (on an average 2 % of the weight of the goods) until the black precipitate in the bath is dissolved and the liquor has assumed a yellowish colour.

Then add the requisite quantity of Naphtyl Blue Black, Naphtylamine Black or Naphtylamine Blue Black in solution, Enter at 60—70° C (140—160 deg. F), raise in 20 minutes to boiling point, and boil for about $1^1/_4$ hour, when $^1/_2$—1 % oxalic acid may be added in order to better exhaust the bath. Then rinse the goods thoroughly, or wash if necessary with fuller's earth and the addition of some acetic acid.

Naphtyl Blue Black N in combination with Sumac.

This combination is used extensively as a substitute for the iron-logwood black, especially for better-class worsteds for gentlemen's wear (dress suitings, etc.).

It imparts to the goods the full handle and high lustre peculiar to materials dyed with Logwood and iron, and besides effects an increase in the weight by about 6—8 %. Over the iron black it offers the great advantage of a simpler and quicker method of dyeing, considerably better fastness to light and acids, of leaving cotton lists or effect threads much cleaner, and covering vegetable impurities of the wool, such as burrs, particles of jute, wood and straw exceedingly well.

In order to ensure good fastness to rubbing, it is sufficient to rinse the dyed pieces in cold water for $^1/_2$—$^3/_4$ hour, whereas iron-logwood black has to be washed for several hours with fuller's earth.

Charge the dyebath with

3—4 % oxalic acid (according to the hardness of the
20 % Glauber's salt crystals [water)
5—7 % Naphtyl Blue Black N
0,2—0,4 % Brilliant Milling Green B
7 % sumac extract of 52 deg. Tw.

Boil up the bath, shut off steam, enter the goods, and work for $^1/_2$ hour without steam and then for about 1 hour at the boil. Should the bath by that time not be exhausted, add another $^1/_2$—1 % oxalic acid or formic acid to the bath.

After exhaustion of the bath add

2—3 % sulphate of copper and
4 % sulphate of iron,

boil for another 30 minutes, and rinse in cold water for $^1/_2$ to $^3/_4$ hour.

The dyebath may be used for dyeing subsequent lots. Add oxalic acid until the precipitate which has formed is completely dissolved, hereafter 5 % Glauber's salt, and then the dyestuff and $3^1/_2$—4 % sumac extract, proceeding otherwise in the same manner as for the first lot.

Acid Colours in Combination with Logwood for the Production of Navies and Dark Blues.

Such a combination yields very cheap navy and dark blues, though not of a very good resistance to light, and is therefore used in the first place for cheap materials, particularly shoddy stuffs, for ready-made goods.

The following dyestuffs come chiefly into consideration for this purpose:

For bright navy and dark blues:
Formyl Violet S4B, 10B
Alkaline Violet CA, C
Water Blue B, R, RB
Wool Blue TB.

For dull navy and dark blues:
Solid Blue R, 3R.

For navy and dark blues of better fastness to light:
Lanacyl Blue BB, R
Lanacyl Navy Blue B, BB
Lanacyl Violet B.

Method of Dyeing.

Dye either according to the one-bath method with the addition of sulphate of iron, sulphate of copper and oxalic acid, or, by the two-bath method on a mordant of chrome and tartar, or of chrome, copper and sulphuric acid.

The dyeings produced according to the one-bath method work out at a very low cost; dyeings on chromed goods on the other hand offer the advantage of greater brightness and better fastness to rubbing.

A. Dyeing according to the One-bath Method.

Charge the dyebath first with
4 % sulphate of iron
3 % sulphate of copper
30—50 % Logwood chips;
then add sufficient oxalic acid (about $1\frac{1}{2}$—2 % of the weight of the goods) to dissolve the precipitate formed in the bath and to make the liquor assume a yellowish colour, hereafter adding the requisite quantity of Acid Colour in solution.

Enter the wetted out goods at about 60° C. (140 deg. F.), raise in $\frac{1}{2}$ hour to the boil, continue boiling for 1 hour, and

exhaust, if necessary, with the addition of $^1/_2$—1 % oxalic acid well diluted with cold water.

After dyeing, rinse very thoroughly, or, if necessary, wash with fuller's earth and the addition of some acetic acid.

Should a subsequent shading with Acid Colours be required, the dyebath must first be cooled off somewhat, and then be heated up again gradually after the addition of the dyestuff.

B. Dyeing according to the Two-bath Method.

Mordant the goods as usual for $1^1/_2$ hours at the boil with

3 % bichrome and $2^1/_2$ % tartar, or with $1^1/_2$—2 % bichrome and $1^1/_2$—3 % formic acid 85 %

or with 3 % bichrome, $1^1/_2$ % sulphate of copper and $1^1/_2$ % sulphuric acid;

then rinse well, and dye in a fresh bath.

Charge the dyebath first with the requisite quantity of the Acid Colour and Logwood, enter the goods at 60° C. (140 deg. F.), raise in $^1/_2$ hour to the boil, and exhaust the bath after $^3/_4$ hour's boiling by the gradual addition of

3—5 % acetic acid or
1—$1^1/_2$ % sulphuric acid;

then rinse thoroughly.

Acid Colours may be used for subsequent shading, as indicated under (A).

The Production of Pastil Colours.

The most delicate shades on woollen piece-goods, the so-called "Ball" or "Pastil" Colours, are produced in the following manner: In case the available pieces are not of a clear white, they are subjected to one of the bleaching processes mentioned on page 36 or 66 and dyed, best cold to lukewarm in the washing machine, either with chalk or with barytes.

Chalk bath. Charge the bath with $1^1/_2$—2 lbs whitening per 10 gallons liquor, or 25—30 % of the weight of the goods

and the requisite quantities of dyestuff, and dye cold to lukewarm for $^1/_2$—$^3/_4$ hour; add then 1—3 % acetic acid, and work until the goods are dyed to shade.

Barytes bath. Work the goods for $^1/_4$ hour in a bath charged with 10—15 % Glauber's salt crystals, add gradually first a solution of 10 % barium chloride and after a little while the colour solution, working as above-stated until dyed to shade.

The goods dyed either way are then rinsed for a short time in the washing machine with a plentiful supply of water, which makes unnecessary the inconvenient beating of the goods in the beating machine; finally the pieces are dried on the tenter.

The most current shades for this process are yellow, orange, pink, red, blue, violet and green, and the most suitable dyestuffs for producing the same are

for yellow: China Yellow B
Acid Yellow AT;

for orange: Orange GG, extra;

for pink: Rosazeïne B
Eosine GGF;

for red: Azo Red A
Azo Rubine A
Azo Orseille BB
Lanafuchsine SB, SG;

for violet: Formyl Violet S4B—10B
Acid Violet 6BS
Alkaline Violet C, CA;

for blue: Formyl Blue B
Brilliant Milling Blue B
Cyanole FF;

for green: Brilliant Milling Green B
Cyanole Fast Green G
Tetra Cyanole V.

For the dyeing of light goods which in point of fastness to light have to meet less exacting demands, Basic Colours may be used also, the method of working being the same as aforestated without however adding any acetic acid.

Dyeing of Woollen and Worsted Piece-Goods with White Silk Effect Threads.

For the production of clear silk effects, low acidity and a high temperature of the dyebath are essential. In order to have the temperature of the dyebath as high as possible, it is advisable to fix a second steam coil in the dye vat, preferably in the main part of the vat in which the goods are running.

Dyeing of Ladies' Dress Goods.

See the subsequent chapter on the "Dyeing of Fabrics composed of Wool and Silk".

Dyeing of Gentlemen's Suitings.

The number of the dyestuffs suitable for dyeing gentlemen's suitings containing silk effect threads is a limited one comparatively owing to the high degree of fastness usually demanded of this class of goods.

For compound shades and blacks, our Anthracene Colours are in the first place to be recommended, for navy and dark blues our Anthracene Chrome Blue F as well as the special brand *Dark Blue WS*, which latter, in addition to good fastness, offers the advantage of a simple method of dyeing and a low cost.

The following dyestuffs and their combinations are best suited for dyeing these goods:

For compound shades (Grey, Mode, Brown, Olive):

Combinations of

Anthracene Yellow BN
Anthracene Chrome Violet B (as a reddening agent)
Anthracene Chrome Blue F.

Method of dyeing: It is advantageous to dye on chromed material, because in such a manner the clearest silk effects are obtained.

Mordant the goods in the customary manner for $1\frac{1}{2}$ hours at the boil with

2—3 % bichrome and $1\frac{1}{2}$—$2\frac{1}{2}$% tartar

or

1—2% bichrome and 1—3% formic acid 85%,

according to the depth of shade, then rinse, and dye in a fresh bath with the addition of

2—5% acetic acid or
5% acetate of ammonia * (for very pale shades).

* For preparation of acetate of ammonia see foot-note on page 8.

Enter the goods at 40—50° C. (105—120 deg. F.), raise in $^1/_2$ hour to boiling temperature, and boil well for $1^1/_2$—2 hours. In the case of dark shades, add gradually, after 1 hour's boiling, 2—4 % acetic acid in order to exhaust the baths.

After dyeing, rinse the goods well, and finally sour off thoroughly with acetic or formic acid.

For subsequent shading, in case only slight quantities are required, the following colours are used:

Acid Yellow AT	Lanafuchsine SG
Orange GG	Azo Wool Blue C

which may be added straight to the boiling bath. If, however, the shading has to be done with Anthracene Colours, the bath must be cooled off first, and then be gradually brought to the boil again.

For navies and dark blues the following are especially well suited:

Dark Blue WS
shaded with
Lanacyl Blue BB, R
Lanacyl Violet B

and for shades which are required to be particularly fast to light, alkalies and perspiration:

Anthracene Chrome Blue F
shaded with
Anthracene Chrome Violet B.

Method of dyeing Dark Blue WS.

Charge the dyebath with

10 % acetate of ammonia
5 % acetic acid 30 % and, say,
4—5 % Dark Blue WS;

enter the goods at the boil, and exhaust the bath, after 1 hour's severe boiling, by the gradual addition of 5—8 % acetic acid. Then rinse, and finally sour off well with acetic or formic acid.

The following dyestuffs are best suited for subsequent shading:

Azo Wool Blue C	Azo Wool Violet 7R
Lanafuchsine SG	Orange GG,

and may be added straight to the boiling liquor.

Method of dyeing Anthracene Chrome Blue F.

Mordant the goods as usual for $1^1/_2$ hour at the boil with

3—4 % bichrome and $2^1/_2$—3 % tartar

or

$1^1/_2$—2 % bichrome and $1^1/_2$—3 % formic acid 85 %;

then rinse, and dye in a fresh bath with about

3 % Anthracene Chrome Blue F and

5 % acetic acid.

Enter at about 70° C (160 deg. F.), raise in 20 minutes to the boil, and, after 1 hour's severe boiling, add 5—7 % acetic acid in several portions, and work for another $^3/_4$—1 hour in the strongly boiling bath. Finally rinse the goods well, and brighten with acetic or formic acid.

Regarding the subsequent shading see the remarks on page 92 relating to compound shades.

Black.

Anthracene Acid Black ST has proved eminently well suited for Blacks on this line of goods; for the production of blue-blacks, Anthracene Acid Black ST may be shaded with some Lanacyl Violet.

Charge the dyebath, which must not contain a volume of water more than 40 times the weight of the goods, with

10 % Glauber's salt crystals

$1^1/_4$ % formic acid of 85 % and

7—9 % Anthracene Acid Black ST,

enter the goods at the boil, add after $^3/_4$ hour's severe boiling $1^1/_4$ % formic acid of 85 %, and work for another 45 minutes in the strongly boiling bath.

Then rinse the material thoroughly in cold water, enter into a fresh, boiling bath charged with $2^1/_2$ % formic acid 85 % (of the weight of the goods), add 2 % bichrome after $^1/_2$ hour's boiling, and work at the simmer for another 30 minutes.

Then rinse, and finally sour off well with formic acid.

Dyeing subsequent lots in the old bath. The dyebath exhausts only partly and may therefore to advantage be used over again. For each subsequent lot to be dyed in the old bath, the latter is replenished with

3 % Glauber's salt crystals and

4—5 % Anthracene Acid Black ST;

enter the goods into the boiling bath, after $^3/_4$ hour's severe boiling add $1^1/_4$ % formic acid 85 %, and work for another $^3/_4$ hour in the strongly boiling bath.

Then rinse, and aftertreat in the same manner as stated for the first lot.

In case the silk is not clear enough, it may be subsequently cleared by working for 20—30 minutes in a bath charged with $^1/_4$—$^1/_3$ gallon ammonium acetate per 100 gallons. For goods dyed with Anthracene Colours, the stripping bath is applied at the boil, and at 70—80° C (160—175 deg. F.) for goods dyed with Dark Blue WS.

The goods are then rinsed, and soured off with acetic or formic acid.

The Dyeing of Military and other Uniform or Livery Cloths.

Dyeing of Military and other Uniform Cloths.

Military and other uniform cloths are mostly dyed in the loose wool, such dyestuffs coming first into consideration as are distinguished by particularly good properties of fastness to milling, light, steaming and carbonising.

Cloths for facings on the other hand are as a rule dyed in the piece; they are not only required to be thoroughly dyed through and as fast to light as possible, but must also possess good fastness to water and alkalies.

The colours used in the production of the most important materials are the following:

Black dyed in the loose Wool.

The Black required for the production of Marengo, greyish black and blue and black mixture cloths (for instance, for trouserings for the German infantry, overcoats for the Austrian infantry, grey cloth for traffic officials and overcoatings for post officials etc.) is dyed in the loose wool with

Anthracene Chrome Black F
„ „ „ FE
Anthracene Chrome Black PFB extra
Anthracene Chrome Black PPN extra
or with
Anthracene Acid Black DSN
„ „ „ DSF
„ „ „ DNG

Charge the dyebath with
2—5% acetic acid
10% Glauber's salt crystals (for piece-goods) and the dyestuff.
Enter at 70° C (160 deg. F.), raise at once to the boil, exhaust the bath after 3/4 hour's boiling by gradually adding.
6—10% bisulphate of soda or
2—4 % sulphuric acid,
and chrome, when the liquor has only a slightly reddish tinge, with
1,5—3% bichrome for 1/2—3/4 hour at the boil, using
for 5% dyestuff 1,5% bichrome
„ 6% „ 2% „
„ 7% „ 2,5% „
„ 8% „ 3% „

When dyeing *Anthracene Chrome Black F and FE*, calcareous water must first be corrected by adding 2% oxalate of ammonia before the addition of the dyestuff and acid.

Black dyed in the Piece.

a) For cloths dyed to very fast colours, the same dyestuffs as mentioned before for loose wool are used, being applied according to the same method and dyed both on white goods and on material which has been previously vat-dyed in the loose state with Indigo Blue MLB.

The before-mentioned dyestuffs offer the advantage of excellent penetration, and the goods dyed in the piece, like those dyed in the wool, possess excellent fastness to light.

b) Facings and other cloths to be produced with good fastness to light are dyed with

Naphtylamine Black R, Naphtyl Blue Black N — with the addition of oxalic acid, acetic acid, Glauber's salt and sulphate of copper according to Method IV, page 7;

or with

Naphtylamine Black S
" " T
" " TN
Naphtylamine Blue Black B
" " " 5B
Naphtol Black B
" " 2B

— with the addition of sulphuric acid and Glauber's salt according to Method II, page 5.

Only in fastness to milling and potting these colours are inferior to those produced as described under (a); in all such cases, however, where these properties of fastness are not essential, they are used quite generally on account of their eminent fastness to light.

Blue dyed in the loose Wool.

Blue is dyed on loose wool both for solid shades and for mixture effects of blue (grey, etc) for military and other uniform cloths, the wool being for such purpose sometimes dyed with Anthracene Colours direct and at others vat-dyed previously with Indigo MLB and then dyed with the dyestuffs mentioned.

The following come into consideration:

Anthracene Chrome Blue F
" " FR
" " B
" " BB
" " G
" " R

— dyed according to the one-bath method with the addition of sulphuric acid, or acetic and sulphuric acid or formic acid, and chromed subsequently; Methods VIII and IX, pages 10 and 11;

or:

Anthracene Chrome Blue BW extra
„ „ RRW extra
„ „ R
„ „ G
„ „ BB

} dyed on a chrome mordant according to Method X, page 11. In the case of specially deep blues produced on a chrome mordant it is recommended to after-chrome lightly in order to obtain as good fastness to milling and alkalies as possible;

further,

Alphanol Blue, all brands } dyed in a weakly acid bath, if necessary with the addition of a little bichrome. Method V, page 8.

Blue dyed in the Piece.

For dark blues dyed in the piece the same dyestuffs are used as for blue on loose wool, the method of dyeing also being the same.

The pieces intended for blue are frequently also bottomed first with Indigo, mostly in the loose wool, the goods being then topped or saddened in the piece with the before-mentioned products.

For dark blue Riding Breeches,

Naphtyl Blue Black N shaded with Alphanol Blue BR extra } dyed according to Method IV, page 7,

is also used.

Pale Blue for Facings.

Bright, pale blues for facings are produced either with easily levelling dyestuffs such as

Cyanole FF or extra
Tetra Cyanole A, V } Method 1, page 4;

or with

Alkaline Blue 6B—2B Method VI, page 8.

Dark Green and Bluish Green dyed in the loose Wool.

Dark green and bluish green military and other uniform cloths, such as are worn by the German customs officials, constabulary and foresters, are dyed almost without exception in the loose wool, the following dyestuffs being used for the purpose:

Anthracene Chrome Blue F
,, G
Anthracene Yellow BN or C
shaded if necessary with
Tetra Cyanole A or
Brilliant Milling Green B
and saddened with
Anthracene Chrome Black 5B
(for one-bath dyeings)
or
Anthracene Acid Black DSF
(for dyeings on a chrome mordant)

dyed in one bath with sulphuric acid or with acetic and sulphuric acid if Anthracene Yellow be used, and afterchromed (Method VIII and IX, pages 10 and 11) or dyed on chromed wool (Method X, page 11).

Dark dyeings produced on chromed wool are afterchromed again lightly in order to obtain best possible fastness to milling and alkalies.

for dark Russian Green:

Anthracene Acid Black DSN
or
Anthracene Chrome Black 5B
in combination with
Anthracene Yellow BN

The dark green and bluish green tones are frequently produced on wool dyed in the Indigo vat, such wool being topped with

Milling Yellow O, Method III, page 6;

Anthracene Yellow C or BN,
or with combinations of
Anthracene Chrome Blue F, G
and
Anthracene Yellow BN, C

dyed by the one-bath method with sulphuric acid, or, in the case of Anthracene Yellow C, with acetic and sulphuric acid, and afterchromed (Methods VIII and IX, pages 10 and 11) or on chromed wool (Method X, page 11). Dark dyeings produced on chromed wool are lightly afterchromed in order to ensure best possible fastness to milling and alkalies.

For brightening green shades, Brilliant Milling Green B or Tetra Cyanole A are used.

Dark Green and Bluish Green dyed in the Piece.

The dyestuffs indicated for loose wool are applied in the same manner for piece-goods, employing Anthracene Yellow BN instead of C.

For cloths dyed in the piece, too, the loose wool is frequently dyed previously with Indigo, and, after the weaving and milling, topped in the piece with Milling Yellow O, Anthracene Yellow BN, or with Anthracene Chrome Blue G, F and Anthracene Yellow BN as indicated above.

The following are used for shading the piece-goods:

Brilliant Milling Green B
Cyanole Fast Green G
Tetra Cyanole V.

Dark Olive dyed in the Wool or in the Piece.

The same dyestuffs as are used for dark and bluish green are used likewise for producing dark olive shades, Anthracene Chrome Brown D or Anthracene Chrome Red A being added.

Green Facings.

The following dyestuffs are employed for dyeing cloths used for green facings:

Cyanole Fast Green G
shaded with
Tetra Cyanole V or
Milling Yellow O
or
Cyanole Fast Green G
shaded with
Acid Yellow AT or
China Yellow B

dyed with the addition of Glauber's salt and sulphuric acid according to Method I, page 4; in the case of combinations with Milling Yellow, the dyeing must be commenced with a small quantity of acetic acid only, the bath being exhausted by the addition of sulphuric acid (Method III, page 6). In order to enhance the fastness to water, it is recommended to treat the dyeings subsequently in a tannic acid solution according to the directions on page 82.

Brown dyed in the loose Wool.

Brown is dyed in the loose wool for the production of plain brown shades as well as for various mixed effects, the following dyestuffs coming into consideration for this purpose:

Anthracene Chrome Brown
A, D, DWN, SWN
shaded with
Anthracene Blue Black C
Anthracene Chrome Blue F, BB, G, R
Anthracene Yellow BN, C
Anthracene Chrome Red A

These are dyed almost exclusively according to the one-bath method with the addition of sulphuric acid; or acetic and sulphuric acid, the goods being chromed subsequently.
(Methods VIII and IX, pages 9 and 10).

Brown dyed in the Piece.

The same dyestuffs are used as for loose wool, the following being particularly well adapted owing to their good penetrating property:

Anthracene Chrome Brown D, SWN
shaded with
Anthracene Blue Black C
Anthracene Chrome Blue F, BB, G, R
Anthracene Yellow BN
Anthracene Chrome Red A.

} The method of dyeing is the same as indicated before for loose wool.

Brown Facings.

In addition to the above-named Anthracene Colours, easily levelling Acid Colours are used for the dyeing of brown facings, such as

Lanafuchsine SG, SB
Orange GG, extra
Tropaeoline OO
Acid Yellow AT
Cyanole Fast Green G

} with the addition of Glauber's salt and sulphuric acid according to Method I, page 4.

Madder Shades dyed in the loose Wool.

The following are used for madder shades:

Diamine Fast Red F
shaded with
Anthracene Yellow C or
Anthracene Blue Black C

} dyed with Glauber's salt and acetic acid, and after chromed according to Method XII, page 13.

The madder shades obtained with Diamine Fast Red F are distinguished above all others by their eminent fastness to alkalies and carbonising, their very much simpler method of application and the better milling properties of the dyed wool.

Madder Shades dyed in the Piece.

The same dyestuffs are used for piece-goods as for loose wool; for shading towards Yellow, however, Anthracene Yellow BN is usually given the preference.

Red Facings.

For red facings the following dyestuffs are used:

Scarlet FR
Scarlet F2R
Scarlet F3R
Crystal Scarlet 6R
Lanafuchsine SB
Lanafuchsine SG
Lanafuchsine 6B
Azo Orseille BB

} dyed with the addition of Glauber's salt and sulphuric acid according to Methods I and II, pages 4 and 5.

Furthermore, a combination of

Brilliant Cochineal or Scarlet with natural Cochineal

is used for dyeing red facings as a substitute for cochineal. As compared with natural cochineal or combinations of cochineal and flavine this combination offers the advantage of yielding dyeings of superior fastness to alkalies and light, better levelling and penetrating properties, as well as facilities in case of any shading being necessary.

The dyestuffs to be considered in the first instance for such combinations are:

Brilliant Cochineal 2R, 4R
Scarlet FR, F2R, F3R
Brilliant Scarlet R, 2R, GG,

which may be applied either alone or in combination with each other according to the shade to be produced. For very yellow shades of scarlet, Orange R or Acid Yellow AT may be used for shading, for bluish shades of red Rosazeïne B.

The well cleaned goods, which should if necessary be bleached, are first boiled for $^1/_2$ hour with

2% oxalic acid and
4% sulphuric acid

and then rinsed lightly.

Thereupon prepare a fresh, short bath with, say,

$4-6\%$ Cochineal (previously ground and tied up in a linen bag),
4% tartar and
$2-3\%$ tin crystals,

boil for 10 minutes, then add cold water, finally adding about

1% Brilliant Cochineal 2R and
1% Scarlet F2R

in solution. The goods are entered into this bath at about 50° C. (120 deg. F.) which is raised in $^1/_2$—$^3/_4$ hour to boiling temperature; after about $^1/_4$ hour's boiling or so the cochineal is removed, whereupon the goods are boiled for another 30—40 minutes and finally rinsed very thoroughly in soft water.

Somewhat brighter and more yellowish shades are obtained by using $^1/_2$—1% of the so-called "Scarlet Composition" either straightaway in the dyeing or by adding the same subsequently. This composition is produced by gradually dissolving 1 part of granulated tin in 4 parts of hydrochloric acid and 2 parts of nitric acid, care being taken to keep the solution cool. It is best to allow the solution to stand for a day or two before use.

For the production of clear shades, prolonged boiling should be avoided, but another main condition is that only pure water entirely free from iron should be employed.

In order to remove impurities, the water used for dyeing is frequently purified with a little chloride of tin, or first of all with bran; or, a clean cloth intended to be dyed a dark shade is allowed to run for 15—20 minutes at the boil in the water employed for the scarlet dyeings. It is best to use vats of wood, tin or tin-plated copper for dyeing; copper, brass and iron parts should in order to avoid spots be avoided or at least be tin-plated.

The goods should be clean and as white as possible; very yellowish cloth is bleached before the dyeing with peroxide of hydrogen or sodium. (For bleaching directions see page 66.)

Hot drying and pressing renders the shade of cochineal dull and bluish; the cloth is therefore dried at 30—40° C. (85—105 deg. F.) and given only a moderately hot pressing.

Crimson Facings.

For the dyeing of crimson facings the following dyestuffs are well adapted:

Croceine AZ
Brilliant Croceine 7B
" " 9B
Lanafuchsine 6B
shaded if necessary with
Azo Wool Violet 7R

dyed with the addition of Glauber's salt and sulphuric acid according to Method II, page 5.

Red Fezzes.

This headgear, as worn in the Orient and by Colonial armies, is dyed with

Diamine Fast Red F / Diamine Scarlet B, 3B — according to Method XII, page 13,

or with

Wool Red B — according to Method III, page 6;

or, if importance is placed merely on very good fastness to light, with

Brilliant Croceïne 3B / Brilliant Cochineal 2R, 4R / Scarlet FR—F3R — dyed with the addition to Glauber's salt and sulphuric acid according to Method II, page 5.

Violet Facings

are mostly dyed with

Acid Violet 6BS
shaded with
Azo Wool Violet 7R, 4B / Lanafuchsine 6B — with the addition of Glauber's salt and sulphuric acid, according to Methods I and II, pages 4 and 5.

In certain instances, violet cloths are also dyed with Methyl Violet R—6B according to Method XIII, page 14.

Orange and Yellow Facings.

The following dyestuffs are used:

For Gold:

Milling Yellow O, dyed according to Methods III and XII, pages 6 and 13.

For Sulphur Yellow:

Combinations of

Acid Yellow AT
with
China Yellow B
or
Fast Yellow S — dyed with the addition of Glauber's salt and sulphuric acid, according to Method I, page 4.

For Orange:

Milling Yellow O, either alone or shaded with Diamine Scarlet B — dyed according to Methods III and XII, pages 6 and 13.

"Field Grey".

Shades of this description have of late attained very great importance through the general endeavour to introduce uniforms for field service which are as inconspicuous as possible, and for this purpose "Field Grey" has been found exceedingly well adapted.

It offers the additional advantage that owing to its dull shade it is much less affected by dust and dirt than the old military colours.

"Field Grey" for German Army Trouserings

is produced as follows:

Dye on a pale blue Indigo bottom with

1 % Anthracene Chrome Brown D
0,35 % Anthracene Acid Brown G
0,08 % Anthracene Yellow C;

commence with the addition of 5 % acetic acid at 40—50° C. (105—120 deg. F.), raise to the boil, and after $^1/_2$ hour's boiling add $1^1/_2$ % sulphuric acid. Cool off after another $^1/_2$ hour's boiling, add

1 % bichrome,

and work for another $^1/_2$—$^3/_4$ hour at the boil.

The prescribed mixture is obtained by mixing

60 parts of the dyed and
40 parts of raw white wool.

"Field Grey" for German Army Coatings

is produced in the following manner:

Dye on a somewhat lighter Indigo bottom than is required for the trousering with

0,74 % Anthracene Chrome Brown D
0,08 % Anthracene Acid Brown G
0,1 % Anthracene Yellow C

1 % bichrome

in same way as indicated above.

The prescribed mixture is obtained by mixing

65 parts of the dyed with
35 parts of raw white wool.

"Field Grey" Shades of Eminent Fastness to Light.

The same shades of "Field Grey" as described before are obtainable with considerably better fastness to light by using wool for the mixing which has been dyed greenish with metallic salts instead of white wool.

This mixing wool stained with metallic salts is absolutely fast to light, and does not fade if exposed for months or even years.

The process has been patented by us in all the industrial countries.

Production of greenish stained Mixing Wool.

Charge the bath with

3 % bichrome
0,5 % sulphate of copper
5—7 % formic acid 85 %,

enter the mixed wool at 60 – 70 ° C. (140—160 deg. F.), raise to the boil, and boil for 1 1/2—2 hours. When the wool, which is at first a yellow shade, has assumed a green colour and the liquor is perfectly clear, throw out the wool, rinse, and dry.

"Field Grey" for Trouserings corresponding to the German Official Pattern.

Dye the loose wool with

4,85 %	Anthracene Chrome Blue F	according to Method VIII, page 9.
1,4 %	Anthracene Yellow C	
1 %	Anthracene Chrome Brown D	
3 %	bichrome	

40 parts of this wool are mixed with
60 parts of the greenish mixing wool mentioned above.

"Field Grey" Tunics corresponding with the German Official Pattern.

The loose wool is dyed with

3,2% Anthracene Chrome Blue F
1,5% Authracene Yellow C
2,7% Anthracene Chrome Brown D
3 % bichrome

} according to Method VIII, page 9.

For the cloth for tunics, the same mixture of

40 parts of dyed wool to
60 parts of the greenish mixing wool is used.

The dyeings produced in this manner are considerably superior both in fastness to light and in their behaviour during carbonising to anything that has been produced hitherto by other methods.

A four months' exposure of an article of clothing to every kind of atmospheric influence did not affect the shade in the very least, whereas materials produced with white wool, exposed alongside thereof, had suffered very much already at the end of half that time.

By altering the shade of the dyed wool or of the mixing wool dyed with metallic salts, the shades may be varied at will; if desired, the drab-coloured mixing wool described for khaki shades may also be used instead of the greenish mixing wool.

Khaki.

Along with "Field Grey", Khaki shades in particular have during recent years become of great importance for military purposes owing to their being so inconspicuous in the field. Khaki is sometimes produced as a solid shade, usually however as a mixture.

The latter again is produced partly by the mixing of one shade only with white, partly also by mixing two, three or more different shades with white, a pale yellow-brown, a gold, a dark brown as well as blue dyeings serving in the first instance as ground colours.

The British Khaki for blouses and tunics, for instance, is produced with a gold, a brown and a pale blue mixed with white, as follows:

53 parts gold	4,5 parts pale blue
17 parts brown	25,5 parts white.

The dyeings are produced on white wool with the following quantities of dyestuff:

A) Gold.
0,4% Anthracene Chrome Brown D
0,3% Anthracene Chrome Blue F
1 % Anthracene Yellow C
1 % bichrome

B) Brown.
2,1 % Anthracene Chrome Brown D
1,25% Anthracene Chrome Blue F
1,8 % Anthracene Yellow C
3 % bichrome

Pale Blue.
1 % Anthracene Chrome Blue F
0,75% bichrome

dyed according to Method VIII, page 9.

In the same manner as described above for "Field Grey", shades of khaki of considerably superior fastness to light may be produced by using mixing wool dyed drab shade with metallic salts instead of white mixing wool.

Production of Drab-coloured Mixing Wool.

Charge the dyebath with
3% bichrome
0,5% sulphate of copper
5—7% formic acid 85%;
enter the washed wool at 60—70° C. (140—160 deg. F.), raise to the boil, and boil for 1½—2 hours, then cool off, add
2% thiosulphate of soda,
and boil for another ½ hour; then rinse, and dry.

A similar effect can be obtained by boiling the wool with
2% chrome alum
2% sulphate of copper
3% oxalic acid
and subsequently adding
2% thiosulphate of soda

In order, for instance, to produce British Khaki for blouses or tunics with very much better fastness to light, the gold and brown should be dyed considerably darker, the afore-described drab-coloured mixing wool being used in place of white wool in order to attain the shade of the mixture in question.

Dye with the following quantities according to the one-bath method:

A. Dark Gold.

0,6 % Anthracene Chrome Brown D
0,5 % Anthracene Chrome Blue F
2 % Anthracene Yellow C
2 % bichrome

B. Dark Brown.

4,5 % Anthracene Chrome Brown D
1,3 % Anthracene Chrome Blue F
2.25% Anthracene Yellow C
3% bichrome

C. Pale Blue.

1 % Anthracene Chrome Blue F
0,75% bichrome

Method VIII, page 9.

For producing the mixture fast to light, the following quantities are required:

43 parts dark gold 5 parts pale blue
10 parts dark brown 42 parts drab-coloured mixing wool.

By mixing other ground colours with the drab-coloured mixing wool, numerous other mixtures inconspicuous in the field may be obtained with most excellent properties of fastness.

Khaki dyed in the Piece.

For Khaki dyeings produced in the piece, combinations of the following dyestuffs are used:

Anthracene Chrome Brown D
Anthracene Yellow BN
Anthracene Chrome Red A
shaded if necessary with
Anthracene Chrome Blue F or
Anthracene Blue Black C

Dyed by the one-bath method with the addition of Glauber's salt and sulphuric acid, and after-chromed (Method VIII, page 9); or, dyed on a chrome mordant (Method X, page 11).

In some special cases, Diamine Colours are used for dyeing Khaki shades on piece-goods, principally the following:

Diamine Fast Yellow FF
Diamine Fast Red F
Diamine Fast Blue G

dyed with the addition of Glauber's salt, Method XII, page 13.

Dyeing of Wool and Fur Felt Hats.

The Dyeing of Wool and Fur Felt Hats.

Hats are dyed either ready-milled, in the form of soft or stiff hat bodies, or in the half-milled state as shapes or as settled felt.

Wooden vats with a false bottom or copper kettles are used as dye vessels; the latter may be heated either with direct or indirect steam, or by a fire underneath the vessel. The system of paddle wheels has proved of excellent value; by means of the revolution of the wheel, the working of the hats otherwise necessary when dyeing in the dye vessel may be dispensed with. More recently the dyeing machines of Mehler and Rey have been adopted in the hat industry, because they effect a saving in manual labour and leave the material in its original quality.

Before dyeing, the hats, shapes or felts must be wetted out well in hot water. If the material contain a large amount of acid, some ammonia is frequently added to the wetting bath, or the goods are boiled for 15 to 20 minutes in water and rinsed again if necessary in fresh water. Soap-milled wool felts should likewise be thoroughly wetted out before dyeing; if they contain any soap residue, they should be wetted out with the addition of some ammonia and finally rinsed in fresh water.

The following groups of dyestuffs are used for dyeing:

1. Acid Colours,
2. Chrome Colours (Anthracene Chrome and Anthracene Acid Colours),
3. Diamine Colours.

On account of their simple method of application and excellent penetrating properties, the *Acid Colours* occupy the first position in hat dyeing. They are not only of primary importance for the dyeing of ladies' and children's hats, but are also used generally for dyeing black and coloured hats for gentlemen's wear.

In point of fastness, dyeings with Acid Colours as a rule satisfy all normal requirements. If the demands in respect to fastness are especially high, or if the hats are subjected to an alkaline rinsing after dyeing and stiffening, *Anthracene Chrome* and *Anthracene Acid Colours* are employed. The Anthracene Colours are likewise of importance for the dyeing of stiffened hat bodies.

The *Diamine Colours*, particularly Diamine Fast Red and Diamine Scarlet, serve for the production of reds fast to light, perspiration and alkalies, especially for fez caps.

Methods of Dyeing Fancy Shades.

I. Method of Dyeing Acid Colours on soft or stiff Wool and Fur Felt Hats and Shapes.

Charge the bath with

10—20 % Glauber's salt crystals

and the requisite dyestuff, enter the wetted out, and if necessary previously neutralised, material at 40—60° C (105—140 deg. F.), raise in $^1/_2$ hour to the boil, and boil for about 30 to 40 minutes until thorough penetration has been effected. Then add 1—4 % sulphuric acid or the corresponding quantity of bisulphate of soda in one or two portions whilst turning the felts inside out, and boil until the bath is completely exhausted, which will be the case in about 20 to 30 minutes.

Soap-milledhats may be entered at once into the bath charged with

10—20 % Glauber's salt crystals and
1— 2 % sulphuric acid,

and are then dyed as described above.

For *stiff hats* add the requisite quantity of acid (2 to 4 % sulphuric acid or 5 to 10 % bisulphate of soda) at the commencement of the dyeing, and reduce the quantity of Glauber's salt to about 5 %. *Shapes* which do not contain too large an amount of acid may be dyed direct with the whole amount of acid necessary.

The boiling should be reduced to the shortest time possible.

II. Method of Dyeing Alkaline Blue and Alkaline Violet on soft Wool Felts.

First boil the hats (according to the amount of acid they contain) with

5—10 % borax,

so that the bath may react slightly alkaline to the end; when the wet felts are cut, the interior should show a slight alkaline reaction.

Then cool off the bath, add the requisite quantity of dyestuff, dye for about $^3/_4$ hour at the simmer, rinse thoroughly, and develop for 20 to 30 minutes in a fresh bath heated to about 50° C. (120 deg. F.) with the addition of

4—5 % sulphuric acid.

For *soap-milled hats* charge the dyebath with

3—5 % borax and the dyestuff,

enter the well wetted goods at about 60° C. (140 deg. F.), raise in 20 minutes to the boil, and continue as above stated.

Copper vessels should be avoided, because copper slightly dulls the shades.

III. Method of Dyeing soft or stiffened Wool and Fur Felt Hats and Shapes with Anthracene Chrome and Anthracene Acid Colours.

Ready-milled and stiffened hats are mostly dyed according to the two-bath method, although good results may likewise be obtained when employing the one-bath method.

a) One-bath method.

Charge the bath with

10—15 % Glauber's salt crystals,
1— 3 % sulphuric acid (according to the depth of the shade to be dyed and the acid still contained in the hats), and

the requisite dyestuff.

Enter the well wetted hat bodies at about 40° C. (105 deg. F.), raise in about 3/4 hour to the boil, and dye boiling for 1 hour. Then cool the bath off to 60 to 70° C. (140—160 deg. F.), add the requisite quantity of bichrome (about 1/3 of the weight of the dyestuff, for shapes even for deep shades not more than 1 1/2 % bichrome), raise again slowly to the boil, and work for another 30 minutes at the boil.

b) Dyeing on a chrome mordant.

Mordant the felts for 1—1 1/2 hour at the boil with

2—4 % bichrome
1 1/2—3 % tartar

or

1—2 % bichrome
1—3 % formic acid 85 %,

rinse, and dye in a fresh bath. Enter lukewarm, raise gradually to the boil, and boil for 1—1 1/2 hour; in order to facilitate exhaustion in the case of deep shades, about 3 % acetic acid are added.

When dyeing *Anthracene Chrome Blue*, *Anthracene Acid Blue*, *Anthracene Chrome Violet* and *Anthracene Acid Black SR* in copper vessels, first charge the bath, heated to 40—50° C. (105—120 deg. F.) with 1/2—1 % sulphocyanide of ammonia (of the weight of the goods), stir well, and allow to stand for 20 minutes before adding the dyestuff, Glauber's salt and acid.

IV. Method of Dyeing Diamine Colours (chiefly red for fez caps).

Charge the bath with

10—20 % Glauber's salt crystals,
5 % acetate of ammonia*,

and the requisite dyestuff.

* Acetate of ammonia is prepared by mixing
10 oz ammonia (0,913 sp. g. or 24 % and
26 1/4 oz acetic acid (8 Tw. or 30 %).
This solution should be neutral and must not change blue or red litmus paper to any extent.

Enter the well neutralised or wetted material at 50° C (120 deg. F.), raise gradually to the boil, and boil for 1—1½ hour; if necessary exhaust the bath by the addition of 2—5% acetic acid. If the goods are to be afterchromed, this is done in the exhausted dyebath by adding 1—2% bichrome or 2—3% chromium fluoride, and boiling again for 30 minutes. When chroming in a fresh bath, 2—3% acetic acid have to be added first.

Method of Dyeing Black.

I. Method of Dyeing Acid Black on soft Wool and Fur Felt Hats.

Charge the bath with

5—15% Glauber's salt crystals

and the requisite dyestuff, enter the well wetted or boiled goods at 60° C (140 deg. F.), raise in 20 to 30 minutes to the boil, and continue boiling about ¾—1 hour until complete penetration has been attained. In order to exhaust the bath completely, add 1—4% sulphuric acid or the corresponding quantity of bisulphate of soda in two portions. When dyeing soap-milled hats, start with

10% Glauber's salt crystals and

5% acetic acid,

otherwise following the same directions as stated above.

II. Method of Dyeing Acid Black on stiffened Wool and Fur Felt Hats.

Charge the bath with

1% sulphuric acid and the requisite dyestuff.

Enter the well wetted hat bodies at 70° C (160 deg. F.), raise in about 20 minutes to the boil, continue boiling gently for ½ hour, and then exhaust the bath by the addition of

2—4% sulphuric acid,

which are added in several portions, well diluted with water.

III. Method of Dyeing Hat Chrome Black, Anthracene Chrome and Anthracene Acid Black.

Charge the dyebath for *soft hats* with

5—15% Glauber's salt crystals and the requisite dyestuff, and enter the wetted hat bodies at 50—60° C (120—140 deg. F.). Raise in 20 to 30 minutes to the boil, continue boiling for ¾—1 hour until the hats are dyed through, then add for wool felt hats 3—4%, and for fur felt hats 4—6% sulphuric acid in several portions, and boil after the last addition for another 20 minutes.

Then chrome in a fresh liquor with the addition of

2—2½ % bicrome and
2 % hydrochloric acid

for 30—40 minutes gently boiling. A rinsing of the hat bodies before chroming is not necessary.

In the case of *soap-milled wool felts*, add besides 10 % Glauber's salt

3—5 % acetic acid,

or for *Anthracene Acid Black SR*

1—2 % sulphuric acid,

proceeding otherwise as stated above.

When using *Anthracene Chrome Black F, FE* or combinations of these brands, it is necessary to first correct the bath, according to the hardness of the water, with 5—10 oz oxalate of ammonia* per 100 gallons liquor, stir well, and then add the dyestuff, Glauber's salt and acid.

When dyeing Anthracene Acid Black SR in copper vessels, the bath is first charged with ½—1 % sulphocyanide of ammonia (of the weight of the goods), and, after stirring, allowed to stand for 20 minutes before adding Glauber's salt, acid and the dyestuff.

In the case of *stiffened hats*, start the dyeing straightaway with the addition of 1—2 % sulphuric acid, proceeding otherwise as afore-stated.

IV. Method of Dyeing Naphtyl Blue Black in Combination with Logwood.

Mordant the hats with

3 % bichrome
2 % sulphate of copper
2 % oxalic acid

for 1—1¼ hour at the simmer, rinse lightly, and dye in a fresh bath with

5—6 % Naphtyl Blue Black N
½ % Indian Yellow G
5—8 % Logwood extract (solid)
1—2 % oxalic acid (according to the hardness of the water).

Enter the mordanted bodies at about 80° C (175 deg. F.), raise at once to the boil, and dye for about 1¼ hour gently boiling.

* Oxalate of ammonia, commercially pure, can be bought or made as follows:

For 100 gallons dye liquor, dissolve

3—9 oz oxalic acid in
1—3 quarts hot water,

and neutralise this solution by adding about 3¼—10 oz ammonia 0,912 sp. gr.

Dyestuffs for Grey, Mode and

(Grey, beige, drab, beaver, pale nutria, monlow,
(On soft and stiffened Ladies' and Gentlemen's

Cheapest method of production	Of better fastness to light
Combinations of Indian Yellow FF, G, R Tropaeoline OO, O Orange II, extra, IV Azo Orseille BB, BE (for pale mode shades) Lanafuchsine SG, SB (for full shades) Blue PC (No 9623) Cyanole AB, BB Fast Acid Green BN	Combinations of *Fast Yellow S *Acid Yellow AT Tropaeoline OO, O Orange GG*, II, extra, IV Azo Orseille BE, BB (for pale mode shades) Lanafuchsine SG*, SB (for full shades) Cyanole Green 6G, B Cyanole Fast Green G* Tetra Cyanole V Cyanole extra The dyestuffs marked with an asterisk (*) are distinguished for their special fastness to light.

Method of dyeing page 114.

The following dyestuffs serve for subsequent shading in the boiling bath:

Fast Yellow S
Orange GG
Azo Orseille BB
Tetra Cyanole V
Cyanole extra
Cyanole Green B, 6G
Cyanole Fast Green G.

The following colours serve for dyeing pale shades fast to milling on shapes or settled felts:

For light beige, pale drab, etc.	For silver grey and light grey:
Orange GG Fast Yellow S shaded with Azo Orseille BB Cyanole extra	Formyl Violet S4B—10B Acid Violet 6BS Brilliant Milling Blue B

in combination with ochre, graphite or talc.

Brown Shades on Hat Felts.

Havana, tobacco, maroon, coffee, loutre, etc.

Hats, Hat Bodies, Shapes, Wool and Fur Felts.

Exceedingly fast to light	Special properties of fastness
Combinations of Anthracene Yellow BN Anthracene Acid Brown G Anthracene Chrome Brown D, DW, DWN, SWN Anthracene Chrome Red A Anthracene Blue Black C Anthracene Chrome Blue G, F, BB, R Method of Dyeing page 115.	Dyestuffs fast to steaming: All the dyestuffs mentioned, with the exception of Cyanole BB, the shade of which is turned somewhat greener on severe steaming. Dyestuffs withstanding the alkaline stiffening and rinsing: Anthracene Yellow BN Anthracene Acid Brown G Anthracene Chrome Brown, all brands Anthracene Chrome Red A Anthracene Blue Black C Anthracene Chrome Blue, all brands Formyl Violet S4B Brilliant Milling Blue B.
The following serve for subsequent shading: For goods which are not stiffened: Fast Yellow S Orange GG Azo Orseille BB Tetra Cyanole V Cyanole extra Cyanole Fast Green G which may be added straightaway to the boiling bath. For goods which are stiffened after dyeing: The above-mentioned Anthracene Colours. The bath must be cooled off somewhat before the dyestuffs are added.	Dyestuffs withstanding the acid milling (dyeings on shapes). All the dyestuffs mentioned withstand the acid milling quite well. The hat bodies must be very thoroughly rinsed after milling in order to remove the sulphuric acid contained in the goods; this is especially necessary in the case of Tropaeoline OO and Orange IV.

The following dyestuffs serve for dyeing pale shades fast to milling on shapes or on settled felts:

For light beige, drab, etc.
The above-mentioned Anthracene Colours.

For light grey:
Anthracene Blue Black C
Anthracene Chrome Blue G, F
shaded with
Formyl Violet S4B—10B
Brilliant Milling Blue B

in combination with ochre, graphite or talc.

Cheapest method of production	Of better fastness to light
Acid Green extra conc. Fast Acid Green BN Blue PC (No. 9623) in combination with Indian Yellow FF, G Tropaeoline OO, O Orange IV, extra Lanafuchsine SG Azo Orseille BE, BB Azo Wool Blue SE (for saddening).	Cyanole Green B, 6G Cyanole Fast Green G in combination with Acid Yellow AT Fast Yellow S Tropaeoline OO, O Orange IV, II, extra Cyanole AB, extra Lanafuchsine SG Azo Orseille BB, BE.
For bright greens: Acid Green extra conc., extra conc. B, 5G Fast Acid Green BN shaded with Naphtol Yellow S Orange extra Tetra Cyanole V.	For shades exceedingly fast to light: Naphtol Green B Naphtol Dark Green G shaded with Acid Yellow AT Orange GG Lanafuchsine SG.

Method of dyeing page 114.

The following are suitable for subsequent shading in the boiling bath:

Fast Yellow S
Orange GG
Azo Orseille BB
Cyanole Green B, 6G
Cyanole Fast Green G
Tetra Cyanole V
Cyanole extra.

Olive Shades on Hat Felts.

Hat Bodies and Shapes, Wool and Fur Felts.

Exceedingly fast to light

Combinations of
Anthracene Chrome Blue G, F, BB
Anthracene Blue Black C
Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chrome Brown D, SWN
Anthracene Chrome Red A
shaded with
Brilliant Milling Green B
Cyanole Fast Green G

Method of dyeing page 115.

The following serve for subsequent shading:

For goods which are not stiffened:

Fast Yellow S
Orange GG
Azo Orseille BB
Cyanole Fast Green G
Tetra Cyanole V.

These dyestuffs may be added straightaway to the boiling bath.

For goods to be stiffened:

The Anthracene Colours mentioned above; the bath must be cooled off somewhat before the dyestuffs are added. Further,

Brilliant Milling Green B
Cyanole Fast Green G.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs mentioned with the exception of Naphtol Green B, the shade of which turns slightly paler and browner on severe steaming.

Dyestuffs withstanding the alkaline stiffening and rinsing:

Anthracene Chrome Blue, all brands
Anthracene Blue Black C
Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chrome Brown, all brands
Anthracene Chrome Red A.

Brilliant Milling Green B
or
Cyanole Fast Green G

prove also sufficient for most purposes.

Dyestuffs withstanding the acid milling (dyeings on shapes):

All the dyestuffs mentioned.

The hat bodies must be rinsed thoroughly after milling in order to remove the sulphuric acid; this is especially necessary when using Tropaeoline OO and Orange IV.

Dyestuffs for Yellow, Orange, Pink, Red,

(On soft and stiffened Ladies' and Childen's Hats,

Cheapest method of production

For yellow and orange:

Naphtol Yellow S
Indian Yellow G, R
Orange II.

Suitable shading products:

Lanafuchsine SG
Azo Orseille BB
Rosazeïne B.

For pink:

Eosine 3G, GGF, L, BN
Eosine Scarlet B
Erythrosine yellow shade, D, B, extra N
Phloxine S
Rose Bengale extra N.

For red:

Brilliant Scarlet, all brands
Crystal Scarlet 6R
Scarlet FR, F2R, F3R, EC
Naphtol Red EB
Rocelline
Lanafuchsine SG, SB.

For particularly brilliant light reds:

Combinations of

Rosazeïne B, 13
Orange extra
Naphtol Yellow S.

Method of dyeing page 114.

Of very good fastness to light

For yellow and orange:

Acid Yellow AT
Fast Yellow S
Indian Yellow FF
Tropaeoline O, OO, G
Orange II, extra, R, GG.

For very bright pinks:

Rosazeïne B, 13
shaded with
Naphtol Yellow S.

For less bright shades of pink:

Lanafuchsine SG, SB
shaded with
Naphtol Yellow S.

For Red:

Croceïne AZ
Brilliant Croceïne, all brands
Azo Rubine A
Brilliant Cochineal RR, 4R

Method of dyeing page 114.

Dyestuffs of very good fastness to light and withstanding the alkaline stiffening and rinsing:

Diamine Scarlet B, 3B
Diamine Fast Red F
shaded with
Diamine Fast Yellow FF
Diamine Yellow CP.

Dyestuffs of still better fastness to alkalies:

Diamine Fast Red F, chromed, shaded with
Anthracene Yellow BN.

Method of dyeing page 115.

Claret, Prune and Violet Shades on Hat Felts.

Caps, Fezzes, Hat Bodies and Shapes, Wool and Fur Felts.)

Cheapest method of production

For claret and prune:

Naphtol Red C
Amaranth
Azo Red A
Brilliant Orseille C
Lanafuchsine SB
Azo Orseille BB
saddened with
Cyanole extra
Cyanole Green 6G, B
Azo Wool Blue SE.

For Violet:

Acid Violet 6BS, 6BC, 4RS.

Method of dyeing page 114.

Of very good fastness to light

For claret and prune:

Azo Rubine A
Brilliant Croceïne 5B, 6B, 7B, 9B
Croceïne AZ
Lanafuchsine SB.

Suitable saddening products:

Azo Wool Violet 7R, 4B
Cyanole Fast Green G.

Method of dyeing see page 114.

Dyestuffs of very good fastness to light and withstanding the alkaline stiffening and rinsing:

Diamine Bordeaux S,

Method of dyeing page 115;

further:

Diamine Fast Red F, chromed, and shaded with
Anthracene Chrome Violet B
Anthracene Chrome Red A,

Method of dyeing see page 115;

or, combinations of

Anthracene Chrome Red A
Anthracene Chrome Violet B
Anthracene Chrome Blue F, FR, R

Method of dyeing see page 115.

For Violet:

Azo Wool Violet 7R, 4B

Method of dyeing see page 114.

Dyestuffs withstanding alkaline stiffening and rinsing,

Anthracene Chrome Violet B
shaded with
Formyl Violet S4B.

Method of dyeing see page 115.

Cheapest method of production

For bright blues:

Cyanole BB
Brilliant Milling Blue B
Indigo Blue N
shaded with
Acid Violet 6BS.

For navy and dark blues:

Indigo Blue SGN
Blue PC (No 9623)
Acid Green extra conc.
Fast Acid Green B, BN
in combination with
Azo Wool Violet 7R, 4B
Acid Violet 6BS
Lanafuchsine SB, 6B
Orange II, extra.

Method of dyeing see page 114.

Of better fastness to light

For bright blues:

Alkaline Blue, all brands
shaded with
Alkaline Violet CA, C
Method of dyeing see page 114;
further:
Cyanole FF, extra, AB
Tetra Cyanole V, SF, extra
shaded with
Acid Violet 6BS.

For navy and dark blues:

Azo Wool Blue SE
Azo Navy Blue B, 3B
Brilliant Naphtol Blue B, 4B, R
Acid Navy Blue A
shaded with
Azo Wool Violet 4B
Acid Violet 6BS
Orange GG, II, extra
(for saddening)

Of still better fastness to light especially for dark blue on fur felts:

Azo Merino Blue, 3B, G
Naphtol Blue G
Method of dyeing see page 114.

The following especially easily levelling dyestuffs may be used for subsequent shading in the boiling bath:

Cyanole, all brands
Tetra Cyanole, all brands
Indigo Blue N
Acid Violet 6BS
Azo Orseille BB
Orange GG.

Shades on Hat Felts.

Hats, Hat Bodies and Shapes, Wool and Fur Felts.

Exceedingly fast to light

Anthracene Chrome Blue
F, FR, G, BB, B, R
RRW extra, BW extra
Anthracene Acid Blue
BBN, BB, 3B.

Bright blues are shaded with
Brilliant Milling Blue B
Formyl Violet S4B
Brilliant Milling Green B
Anthracene Acid Blue RR.

Very deep dark blues are shaded with
Anthracene Acid Black DSF
(for dyeings produced on a chrome mordant)
Anthracene Chrome Black 5B
(for one-bath dyeings.)

Method of dyeing see page 115.

Anthracene Chrome Blue RRW extra, BW extra and Anthracene Acid Blue 2R are exclusively dyed on a chrome mordant..

The following dyestuffs serve for subsequent shading:

For goods which are not stiffened:

Cyanole extra
Tetra Cyanole V
Acid Violet 6BS
Azo Orseille BB
Orange GG.

These dyestuffs may be added straight to the boiling bath.

For goods which are stiffened after dyeing:

The Anthracene Colours enumerated above, and Formyl Violet S4B; the bath must be cooled off before adding the dyestuffs. Further, Brilliant Milling Blue B and Brilliant Milling Green B.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs mentioned, with the exception of
Cyanole BB
Anthracene Acid Black DSF,
the shade of which is somewhat changed on severe steaming.

Dyestuffs withstanding the alkaline stiffening and rinsing:

Anthracene Chrome Blue, all brands
Anthracene Acid Blue, all brands
Anthracene Chrome Black 5B
Anthracene Acid Black DSF
Brilliant Milling Blue B
Formyl Violet S4B.

For most purposes,
Brilliant Milling Green
is also sufficient.

Dyestuffs withstanding the acid milling (for dyeings on shapes:

All these dyestuffs withstand the acid milling very well.

The hat bodies must be rinsed very thoroughly after the milling in order to remove the sulphuric acid.

Blacks of very good fastness to light and normal fastness to steaming (for soft fur and wool hat bodies)

For bluish blacks:

Naphtylamine Black 6B
Hat Black 3BV.

For deep bluish blacks:

Naphtylamine Black 4B
Hat Black BB
Hat Black BBV, HTV extra.

For cheap deep blacks:

Naphtylamine Black X2B, X3B, OO.

In addition to Hat Black, a very favourite combination for fur hats is that of

Naphtylamine Black 4B
Naphtol Blue Black

with a little

Indian Yellow G.

Blacks of very good fastness both to light and steaming (for soft fur and wool hat bodies)

For bluish blacks:

Naphtylamine Black 7BS
Hat Black 5BV, F
Naphtylamine Blue Black 5B.

For deep bluish blacks:

Hat Black H extra, FC (especially for fur felt hats).
Hat Black MC (for wool felt hats)
Naphtylamine Black S, TJ, T
Naphtylamine Black SGG (for greenish blacks)
Naphtylamine Blue Black B.

For cheap deep blacks:

Naphtylamine Black SS2B, SS3B, SOO.

For bright-finished hats, the following are principally used:

For bluish black:

Naphtol Black 6B, 3B
Azo Merino Black 8B, 6B, 6BE;

and for deep black:

Naphtol Black 2B, B, SG
Azo Merino Black B, BE.

For method of dyeing see page 116.

Suitable dyestuffs for shading:

For blacks with a bluish cast:
- Acid Violet 6BS
- Tetra Cyanole V
- Cyanole Green B, 6G
- Brilliant Milling Green B

For jet blacks:
- Indian Yellow G, FF
- Tropaeoline OO, O
- Orange II, extra
- Naphtol Green B
- Naphtol Dark Green G.

Blacks of very good fastness to light and steaming (for stiff fur and wool hat bodies)	Blacks of very good fastness to light, steaming, alkalies and alkaline rinsing (for soft hair and wool hat bodies and such as are stiffened after dyeing)
For blue-blacks: Hat Black 5BV, F Naphtylamine Black 6B Naphtylamine Blue Black 5B.	For blue-blacks: Anthracene Chrome Black 5B.
For deep bluish blacks: Hat Black H extra, HV extra, FC, MC Naphtylamine Blue Black B for method of dyeing see page 116.	For deep blue-blacks: Anthracene Chrome Black F Hat Chrome Black B, BT Anthracene Acid Black DNG in combination if necessary with Anthracene Chrome Black 5B.
For hats subjected to an alkaline rinsing after dyeing: Anthracene Chrome Black 5B (for bluish blacks) Hat Chrome Black B, BT Anthracene Chrome Black F Anthracene Acid Black ST, DNG Anthracene Acid Black DSF, DSFB, DSN; for method of dyeing see pages 116 and 117.	For cheap deep blacks. Anthracene Acid Black DSF, DSFB, DSN.
For specially cheap blacks: Naphtyl Blue Black N in combination with Logwood, dyed on a mordant of bichrome, bluestone and oxalic acid; for method of dyeing see page 117.	For cheap blacks, particularly on wool hat bodies: Anthracene Acid Black SR; for method of dyeing see pages 116 and 117.
Suitable dyestuffs for shading: For acid blacks (Hat Blacks): Those stated in columns 1 and 2; for chrome black: Those stated in column 4.	Suitable dyestuffs for shading: Formyl Violet S4B Brilliant Milling Blue B Brilliant Milling Green B Anthracene Chrome Blue F, FR, B Anthracene Yellow BN Brilliant Milling Green B.

The Dyeing of Loose Wool and Hair for Mixture Felts. Melange Hats.

Anthracene Chrome and *Anthracene Acid Colours* are used in the first place for the dyeing of loose wool and hair, according to the dyeing instructions and in the combinations mentioned on pages 17—32 of the chapter on "The Dyeing of Loose Wool".

The dyeings so obtained answer every requirement made in the hat industry with respect to fastness and not affecting the material; they withstand alkaline as well as acid milling perfectly, and are exceedingly fast to light, hot pressing, steaming, carbonising and perspiration.

For Blacks, the *Anthracene Chrome Black F, FE, P extra* and *PFB extra* in particular have been adopted quite generally. *Naphtylamine Black 635 J* is also very serviceable, especially for dyeing loose hair in an open kettle, being dyed in a sulphuric acid bath (Method II, page 5) without any subsequent treatment.

Our new patented process described on pages 32 and 106—110 is very well suited for the production of mixture effects of specially good fastness to light.

In addition to the Anthracene Colours, some of the *Acid Colours* fast to milling, such as *Milling Yellow*, *Milling Red*, *Formyl Violet*, *Formyl Blue*, *Brilliant Milling Blue*, *Alkaline Blue* and *Brilliant Milling Green*, are also used to advantage for the production of bright fancy shades, and for Reds, *Diamine Fast Red* and *Diamine Scarlet*. These dyestuffs likewise resist acid milling, particularly in pale and medium shades; Milling Yellow and Diamine Fast Red are perfectly satisfactory in this respect even in dark shades.

Loose hair is dyed like loose wool, considerably more dyestuff being however required for hair than for wool.

It is an advantage to dye hair in machines, by which method the material is best preserved and felting avoided. When dyeing in open kettles, any immoderate handling or boiling should be carefully avoided, because loose hair is considerably more apt to felt than loose wool.

In order to remove any traces of mercury mordant, it is essential that the hair be soaked well in hot water before dyeing.

When *after-chroming* Anthracene Colours, the liquor must be cooled off well before adding the bichrome, being then brought only gradually to the boil again in order to make the chroming liquor penetrate the material thoroughly.

The Production of Mixture Felts by Dyeing Hat Bodies Ready-milled.

Mixture effects similar to those produced by mixing material dyed in the loose state may be obtained by dyeing milled hat bodies.

For this purpose the undyed wool is mixed with white vegetable fibres (China-grass, cotton, etc.), milled as customary, and dyed in the form of bodies with dyestuffs which leave the vegetable fibres undyed.

The dyestuffs best suited for this article are the following:

Fast Yellow S
Acid Yellow AT
Naphtol Yellow S
Orange GG
Azo Orseille BB, BE
Lanafuchsine 6B
Acid Magenta
Brilliant Scarlet, all brands
Crystal Scarlet 6R
Scarlet FR, F2R, F3R
Naphtol Red C, EB
Amaranth
Azo Red A
Azo Rubine A
Acid Violet 6BS, 4RS
Formyl Violet, all brands
Azo Wool Violet 7R, 4B
Cyanole, all brands
Tetra Cyanole, all brands
Brilliant Milling Blue B
Indigo Blue N, SGN
Blue PC (No 9623)
Azo Wool Blue SE
Azo Navy Blue B, 3B
Acid Navy Blue A
Azo Merino Blue G, 3B

Cyanole Green B, 6G	Naphtylamine Black EFF	for black.
Cyanole Fast Green G	Naphtylamine Black S	
Fast Acid Green BN, B	Naphtylamine Blue Black 5B, B	
Acid Green, all brands		

The dyeing is carried out as described on pages 114 and 116. In order to ensure as clear effects as possible, attention must be paid to a thorough exhaustion of the dyebaths. The goods must be rinsed very thoroughly after dyeing in order to remove any sulphuric acid still present.

Note: For coloured effects, either vegetable fibres may be used which have been previously dyed fast to acids, or the fibres are dyed with suitable Diamine Colours in a fresh, cold bath subsequently to dyeing the hats with Acid Colours.

Print and Discharge Effects on Hat Felts.

a) Producing Effects by the Application of Print Paste.

This is carried out as follows:

The bodies, dyed to any given shade, are painted over with a dark print paste, dried, steamed, and washed.

The parts painted in this manner show out as dark patterns or mixture effects on the lighter ground. The same mixture effects may be obtained in a like manner on both sides of the hats by applying the print paste accordingly.

This style may also be varied, for instance by painting both sides of the felts with print pastes of different colours, or uniformly painting only one side of the bodies, dyed previously a given shade, with a darker print paste than the ground colour, and after drying brushing one or both sides with a differently coloured print paste.

b) Producing Discharge Effects by Discharging with Hyraldite W.

For the production of white or light-coloured effects on a dark ground, Hyraldite discharges are resorted to, containing, according to requirement, an admixture of dyestuffs suitable for producing coloured discharge effects; such discharges are brushed on to the goods.

The following dyestuffs, which are easily dischargeable with Hyraldite, may be used for dyeing the bodies:

Acid Yellow AT
Fast Yellow S
Orange extra, II, R, GG
Lanafuchsine SG
Scarlet FR, F2R, F3R
Brilliant Scarlet GG—3R
Naphtol Red C
Acid Violet 4RS
Cyanole FF, extra (for pale blue)
Azo Wool Blue C
Naphtylamine Black EFF.

Dye in the manner customary for Acid Colours with the addition of Glauber's salt, adding sulphuric acid subsequently as described on pages 114 and 116.

Particulars for printing and discharging will be found on pages 315 to 330 of our book on "Wool Dyeing", or in Volume IV of this book (Printing).

Silk Dyeing.

The Dyeing of Silk.

Silk is principally dyed in hank form, more seldom in the piece, and then only in light qualities of goods. The dyestuffs enumerated in the following tables and the instructions for application apply equally for silk yarn and piece-goods.

The following groups of dyestuffs come in the first place into consideration for the dyeing of silk:

Acid Colours answer the normal requirements in point of fastness, and are generally used the most;

Diamine Colours are used in particular for the production of dyeings fast to water, washing and milling on some special articles;

Basic Colours serve chiefly for producing bright shades requiring a full bloom, but no particular fastness; they are used preferably for the dyeing of silk weighted with tin;

Immedial Colours are used exclusively for producing dyeings fast to washing and boiling on chappe silk, and silk for sewing and embroidery.

Acid Colours	Basic Colours
Pink, Red and Claret.	
*Eosine 3G, GGF, L, BN	*Irisamine G
*Eosine Scarlet B	*Safranine GGS, S No 150
*Erythrosine B, D, extra N	*Diamond Magenta Ia
*Rose Bengale extra N	*Magenta yellow shade
*Phloxine S	*Cerise Ia
*Rosazeïne B	*Russian Red B, G.
**Brilliant Croceïne, all brands	
**Croceine AZ	
Brilliant Scarlet, all brands	
*Scarlet EC	
Brilliant Cochineal 2R, 4R	
Roccelline	
*Naphtol Red EB	
*Lanafuchsine SG, SB, 6B	
**Azo Rubine A	
Azo Red A	
Azo Orseille BB	
Brilliant Orseille C	
*Amaranth B	
*Wool Red B.	
Blue, Dark Blue and Grey.	
*Cyanole extra, FF, AB, C, V	*Methylene Blue BB
*Tetra Cyanole A, SF, V	*New Methylene Blue N, GG, GB, R, 3R
*Formyl Blue B	*Methylindone B, R
*Brilliant Milling Blue B	*Indazine M
Indigo Blue SGN	*Naphtindone BB
*Methyl Blue for silk	*Blue for Silk DA (for shading log-wood black).
*Pure Soluble Blue	
Blue BS, FS, RS, RRS	
*Victoria Blue B	
**Solid Blue 6G, R, 3R	
*Induline B, 2B, 3B	
*Aniline Grey B, R	
*Silver Grey N	
*Alkaline Blue, all brands.	

For method of dyeing see pages 140 and 141.

normal Requirements for Fastness.

Acid Colours	Basic Colours
Yellow, Orange and Brown.	
*Naphtol Yellow S	*Thioflavine T, TCN
*China Yellow B	*Diamond Phosphine GG, R
*Acid Yellow AT	*Paraphosphine G, R
*Indian Yellow G, FF, R	*Tannin Orange R
**Milling Yellow O	*Chrysoïdine AG, crystals
*Orange II, EN, R, IV	*Bismarck Brown GG, FFG, EE.
**Orange GG	
*Acid Brown D.	
Green and Violet.	
*Acid Green, all brands	*Brilliant Green crystals extra
*Fast Acid Green BN	*Solid Green crystals O
*Cyanole Green B, 6G	*Malachite Green conc.
*Cyanole Fast Green G	*Silk Green MS (for shading logwood black)
*Brilliant Milling Green B	*Methyl Violet 6B—4R
Naphtol Green B	*Crystal Violet 10B
Naphtol Dark Green G	*Tannin Heliotrope.
Azo Wool Violet 7R, 4B	
*Formyl Violet S4B, 5B, 6B, 10B	
*Acid Violet 6BS, 4RS	
*Alkaline Violet C.	
Black.	
Naphtylamine Black 4B, 6B, D, X2B, X3B, R	
Naphtyl Blue Black *FBB, N	
**Naphtol Blue Black	
*Neutral Wool Black B, G	
Gloria Black B, I, II	
*Alphanol Black B, BG, R	

The dyestuffs marked with an asterisk (*) are especially well suited for the dyeing of silk *weighted with tin;* those marked with two asterisks (**) yield on this material dyeings of *good fastness to light.*

For method of dyeing see pages 140 and 141.

Diamine Colours.

Yellow and Orange.

*Thioflavine S
**Diamine Fast Yellow B, FF, M
Diamine Fast Yellow A, coupled with Nitrazol C
**Diamine Yellow CP
*Diamine Orange F
*Diamine Orange G, D
*Primuline, developed with Resorcine.

Pink, Red and Claret.

**Diamine Rose GD, BD, BG
*Direct Rose T
**Diamine Scarlet B, 3B
*Diamine Purpurine B, 3B, 6B
**Diamine Fast Red F, aftertreated if necessary with chromium fluoride or bichrome
**Diamine Bordeaux S
*Diamine Brilliant Bordeaux R
Diamine Azo Scarlet B, R } developed with Beta Naphtol
Primuline

Brown.

**Diamine Brown 3G, R, B, M } aftertreated if necessary with chrome and copper
Oxy Diamine Brown 3GN
**Diamineral Brown G
*Diamine Fast Brown G, R
Diamine Nitrazol Brown RD, BD, T coupled with Nitrazol C.

*Diamine Green B, CL
Diamine Green G, if necessary aftertreated with chromium fluoride
*Diamine Dark Green N
**Diamine Violet N, BB
*Oxy Diamine Violet B, R, G.

Blue and Grey.

*Diamine Sky Blue
Diamine Sky Blue FF } direct or coppered.
Diamine Blue RW
*Diamine Blue BX, 2B, 3B, 3R
**Diamine Fast Blue G, FFB, FFG
*Diamine Steel Blue L
Diaminogene Blue GG, BB, NB, NA, 3RN } developed with Beta Naphtol
Diaminogene Sky Blue N
Diamine Azo Blue R, RR
*Diamine Dark Blue B
*Diamine Grey G
**Diaminogene extra
*Diaminogene B, extra } developed with Beta Naphtol
Diamine Black BH

Black.

Diamine Black BH } developed with Phenylene Diamine or Resorcine.
Diaminogene B
*Oxy Diamine Black FFC, JEI, JB, JW.

For method of dyeing see page 141.

Acid Colours.

*Milling Yellow O
Anthracene Yellow BN, C, GG
Anthracene Acid Brown G, R, N, B
Anthracene Chrome Brown DWN
(aftertreated with chromium fluoride or bichrome.)
*Rosazeïne B
*Victoria Blue B.

*Brilliant Milling Blue B
*Formyl Blue B
*Alkaline Blue, all brands
*Formyl Violet S4B
*Brilliant Milling Green B
Napthyl Blue Black N, **FBB
Alphanol Black B, BG, R
Naphtylamine Black D
Anthracite Black B, aftertreated with chromium fluoride.

For method of dyeing see page 140.

All the dyestuffs mentioned possess comparatively speaking very good *fastness to water*, which may generally be still further improved by an *aftertreatment with tannin and antimony*. The *Basic Colours* enumerated on pages 136 and 137 may likewise be used for producing dyeings fast to water if subjected to the same aftertreatment with tannin and antimony.

Dyeings of the products marked with an asterisk (*) are by such treatment rendered *fast to washing and milling*; similarly good in this respect may be designated the dyeings fixed by an *aftertreatment with metallic salts*, by *diazotising and developing* or by *coupling with Nitrazol*.

The products marked with two asterisks (**) are also suited for the dyeing of silk weighted with tin.

The following withstand *de-gumming in a boiling soap solution:*

Primuline, developed with Beta Naphtol,
Diamine Fast Yellow A, coupled with Nitrazol C,
Formyl Violet S4B, Victoria Blue B (treated with tannin and antimony.)

3. Immedial Colours for Silk.

The following products are especially well suited for the production of dyeings fast to washing, milling and boiling:

Immedial Yellow GG, D
Immedial Cutch O, BG
Immedial Brown BR
Immedial Dark Brown D conc.
Immedial Bordeaux G conc.
Immedial Maroon B conc.
Immedial Violet C
Immedial Sky Blue paste and powder conc.
Immedial Indone 3B conc., B conc., BBF conc., BF conc., R conc., RR conc.
Immedial Indogene GCL conc.
Immedial Green GG extra, BB extra
Immedial Brilliant Green G extra
Immedial Deep Green G
Immedial Olive 3G
Immedial Black FF extra, AZ, BZ conc.

For Method of Dyeing see page 141.

Directions for Dyeing.

Method of Dyeing Acid Colours.

These are generally dyed in boiled-off liquor* slightly acidulated with *sulphuric acid*. Enter the goods at 40—50° C. (105—120 deg. F.), raise to the boil, and allow to cool off a little; any excess of acid should be avoided in order to ensure good levelling. Rinse, after dyeing, and brighten with acetic, tartaric, formic or sulphuric acid.

The following products are best dyed with the addition of *acetic acid:*

Eosine 3G, GGF, L, BN
Eosine Scarlet B
Erythrosine B, D, extra N
Rose Bengale extra N
Phloxine S
Rosazeïne B
Naphtol Green B
Anthracene Yellow C, BN, GG
Anthracene Acid Brown G, R, N, B
Anthracene Chrome Brown D WN
Naphtylamine Black 4B, 6B, D, X2B, X3B, R
Naphtyl Blue Black N, FBB
Gloria Black B, I, II
Alphanol Black B, BG, R
Neutral Wool Black B, G.

Dye boiling hot, and only add some sulphuric acid towards the end of the dyeing operation in order to fully exhaust the bath. Regarding the aftertreatment of the dyeings see details on page 142.

* If boiled-off liquor is not available, a very useful substitute may be prepared according to the following directions:

3 lbs soap, 9 oz glue or gelatine, 3 oz olive oil and 3 oz common salt are well boiled in about 10 gallons water. The solution is applied just like ordinary boiled-off liquor; the killing with acetic or sulphuric acid must take place very gradually and under constant stirring.

Alkaline Blue and *Alkaline Violet* are dyed boiling hot in a fatty soap bath with the addition of some borax, followed by rinsing, and brightening hot with sulphuric acid.

Method of Dyeing Diamine Colours.

Dye in a neutral boiled-off liquor charged with about 10 % Glauber's salt, and add towards the close of the dyeing operation 3—10 % acetic acid, according to the depth of shade, to ensure complete exhaustion of the bath. Enter lukewarm, raise gradually to the boil, and dye for about 1 hour at that temperature. In the case of Diaminogene B and Diamine Black BH it is an advantage to add 1—2 % sulphuric acid. After dyeing and rinsing, aftertreat, develop, or couple, as the case may be (pages 142 and 143), and brighten with acetic or tartaric acid.

Method of Dyeing Basic Colours.

Dye in a boiled-off liquor slightly acidulated with acetic acid; enter lukewarm, heat to 70—80° C. (160—175 deg. F.), and then allow to cool off a little; an excess of acetic acid facilitates the levelling.

After dyeing, rinse, and brighten slightly with acetic or tartaric acid.

Basic Colours are also frequently dyed in pale shades in a fatty soap bath at 30—40° C. (85—105 deg. F.).

Method of Dyeing Immedial Colours.

Dye the boiled-off material in a boiling hot bath containing a volume of water 20 times the weight of the material to be dyed and $^1/_2$—1 lb dyestuff—for blacks 2—3 lbs—per 10 gallons liquor. The dyestuff is boiled for about 10 minutes in a little water with its own weight of sodium sulphide (Immedial Indogene GCL conc. and Immedial Indone with double their weight, Immedial Black FF extra and AZ with $^2/_3$rds their weight, of sodium sulphide and double the quantity of glucose as of sodium sulphide; add this solution to the hot dyebath charged previously with $1^1/_2$ oz soda, $4^1/_2$ oz Turkey-red oil and $^1/_2$—1 lb Glauber's salt per 10 gallons liquor. Dye for about 1 hour, best on bent sticks, squeeze off lightly, rinse, soap,and brighten with acetic acid.

The dyeings are exceedingly *fast to washing* and *milling;* if they are required to withstand a subsequent *boiling-off*, it is advisable to aftertreat them in a fresh boiling hot bath with

2% bichrome
2% sulphate of copper
5% acetic acid;

then rinse, and brighten.

In the case of black it is recommended to mordant the silk previously with nitrate of iron of 25—32 deg. Tw., to rinse very thoroughly, and then to dye.

Methods of Aftertreatment for producing Dyeings on Silk Fast to Water, Milling and Washing.

a) Aftertreatment with Metallic Salts.

The fastness to water, milling and washing of some of the Acid and Diamine Colours (see pages 138 and 139) is considerably improved by subjecting the goods are to an aftertreatment with metallic salts. Depending on the nature of the dyestuff used and the depth of shade to be produced, treat the goods with

2—4% sulphate of copper
or
1—2% sulphate of copper and
1—2% bichrome
or
1—3% chromium fluoride
or
1—2% bichrome

} of the weight of the material

for 1/4 hour in a boiling hot bath previously charged with 5—8% acetic acid, then rinse, and brighten.

By such treatment with sulphate of copper, the fastness to light of the dyeings is likewise materially improved.

b) Aftertreatment with Tannin and Antimony.

Some of the Acid Colours, especially those enumerated on page 139, and all the Basic Colours (see pages 136 and 137), are improved in point of fastness to water by an aftertreatment with tannin and antimony; some of these products are even rendered very fast to washing and milling by such aftertreatment.

Immerse the dyed silk for some hours or overnight in a bath heated to 50—70° C. (120—160 deg. F.) and containing 1—2 lbs pure tannic acid per 10 gallons liquor; squeeze off, and treat for 1/2 hour in a fresh bath of 30—50° C. (85—120 deg. F.) containing 8—12 oz of some antimony salt per 10 gallons liquor; then rinse, soap if necessary, and brighten.

c) Diazotising and Developing; Coupling with Nitrazol.

This treatment renders the dyeings absolutely fast to water and exceedingly fast to washing and milling; Primuline is thereby rendered fast to de-gumming.

For purposes of *diazotising* and *developing*, treat the dyed and rinsed silk for $^1/_4 - ^1/_2$ hour in a wooden vessel with a cold bath charged with

3% nitrite of soda and
9% hydrochloric acid or 6% sulphuric acid,

rinse, and develop at once. The various developers are used according to requirement in the following quantities reckoned on the weight of the silk):

0.7% Phenylene Diamine, dissolved with one-third of its own weight of soda, or
1 % Beta Naphtol, dissolved with its own weight of caustic soda lye of 77 deg. Tw, or
0.7% Resorcine, dissolved with double its weight of caustic soda lye of 77 deg. Tw.

Work for $^1/_4 - ^1/_2$ hour in the cold bath, rinse, soap hot, and brighten.

The *coupling with Nitrazol C* is carried out in a cold bath in which treat the dyed and rinsed silk for $^1/_2$ hour with

3—6 % Nitrazol C
1—2 % soda
$^1/_4 - ^1/_2$ % acetate of soda;

then soap, rinse, and brighten.

Nitrazol C should be dissolved in cold water and filtered.

The Application of Basic Colours for Shading Logwood Black.

The following products are suited for shading logwood black in a fatty soap bath:

Blue for Silk DA
Green for Silk MS
Alkaline Blue, all brands } for bluish blacks

Alkaline Violet C
Methyl Violet, all brands
Magenta } for reddish blacks.

These products should be carefully dissolved in condensed water and added through a filter to the dyebath.

Dyeing of Tussah (Raw) Silk.

Tussah silk is dyed like ordinary silk; for dyeing *fancy shades*, the same dyestuffs as mentioned before are applied and in the same manner. As tussah silk, however, does not absorb the dyestuff quite so easily as ordinary silk, the dyebaths should be charged with somewhat larger quantities of dyestuff and the dyeing operation protracted a little. More absorbent is bleached tussah silk, which of course yields clearer shades. The bleaching is carried out as follows:

Fill a clean wooden vessel with cold water charged with $1^1/_4$ lb sulphuric acid of 168^0 Tw. per 10 gallons. While continually stirring, add *slowly* 1 lb peroxide of sodium per 10 gallons liquor and then a little silicate of soda until a slightly alkaline reaction sets in. Then enter the silk, which has been previously cleaned well in a hot soda and soap bath, and raise the temperature to 90—95° C. (195—205 deg. F.) in the course of an hour. After 6 to 8 hours the bleaching is completed; thereupon rinse the goods, treat for some time in a lukewarm solution of bisulphite which has been slightly acidulated, rinse again, and dry.

The following dyestuffs are particularly well suited for *Blacks:*

Naphtylamine Black 4B, 6B, X2B, X3B and
Neutral Wool Black B, G

which may be shaded, as required, with a little Indian Yellow R; dye boiling hot with $15-20^0/_0$ dyestuff in a boiled-off liquor acidulated with acetic acid, and exhaust by the addition of a little sulphuric acid.

Dyeing of Bourette Silk and Silk Noils.

For this purpose any of the dyestuffs mentioned on pages 136 to 139 may be used. For the production of particularly bright shades at a low cost, Basic Colours are largely used, while for dyeings fast to milling, the Diamine Colours in particular are used as well as the Acid Colours indicated on page 139. It is not necessary to use boiled-off liquors, it being sufficient to work in acetic or sulphuric acid baths.

Union Dyeing.

The Dyeings of Unions in the Piece, in Hanks and in the Loose Material.

Unions are dyed either

A. by the **one-bath method,** with Diamine Colours and wool dyestuffs together in a neutral bath, or

B. by the **two-bath method** in *two* (*or more*) baths; in the latter case the wool is dyed first and then the cotton, or vice versâ the wool after the cotton.

A. Dyeing by the One-bath Method.

For dyeing by the one-bath method the Diamine Colours are divided into the following groups according to their behaviour towards the vegetable and animal fibres:

1. Diamine Colours which dye cotton and wool practically the same shade;
2. Diamine Colours which dye the cotton deeper than the wool;
3. Diamine Colours which dye the wool deeper than the cotton.

A further group to be considered is

4. Wool Colours which go on to wool in a neutral Glauber's salt bath and which are used for shading the wool in order to bring it to the same shade as the cotton.

The relative absorption of the dyestuff on the part of the wool and the cotton being dependent in the main on the temperature of the dyebath and the quantities of salt added thereto, as well as on the affinity of the dyestuffs used to the material to be dyed, it is impossible to lay down hard and fast rules about the groups to be employed in each case.

A general rule is that a high temperature is favourable to dyeing the wool, whereas the dyestuffs go more on to the cotton at a lower temperature.

1) Diamins Colours which dye wool and cotton practically the same shade.

Thioflavine S
Oxy Diamine Yellow GG, TZ
Diamine Fast Yellow FF, B, M,
Diamine Orange B [3G
Oxy Diamine Orange G, R
Diamine Rose GD, BG
Oxy Diamine Red S
Diamine Red 3B, 5B, 6B, 10B, D, DN
Cotton Red A
Diamine Purpurine B, 3B, 6B, V
Diamine Fast Red F
Diamine Brilliant Bordeaux R
Diamine Bordeaux VRO
Diamine Brown 3G, R, M, MR, S, BWA, GWA, 30a, 33, 37, 40, 42a, 43
Diamine Violet 2204J, 2205J
Oxy Diamine Brown G, 3GN
Diamineral Brown G
Diamine Catechine G, 3G
Union Brown TD, 1926J, 2089J
Union Dark Brown A
Diamine Blue RW
Diamine Bengal Blue G
Diamine Azo Blue 6B
Diamine Steel Blue L, 2206J
Union Blue BJ, RJ, BB, OHDF, 761J, 806J
Union Navy Blue 780J
Diaminogene B
Direct Grey 2207J
Diamine Green G, B, CL, BO.

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2) Diamine Colours which dye the cotton deeper than the wool.

*Diamine Fast Yellow A, AGG,
*Diamine Orange G, D [AR
Direct Rose T
Diamine Fast Scarlet GG, 4BN, 6BS, 6BGN, 8BN
Diamine Bordeaux B
Oxy Diamine Violet B, G, R
Diamine Heliotrope B, G, O
Diamine Violet N, BB, RB
*Diamine Nitrazol Brown G
Diamine Brown ATC
Diamine Catechine B
Diamine Fast Brown G, R
*Oxy Diamine Brown RN
Diamine Sky Blue, FF, FFS
Diamine Pure Blue A
*Diamine Fast Blue FFB, FFG, G, BN
Oxy Diamine Blue G, 3G, 5G, B, R
Diamine Blue BB, 3B, BG, NC, 51, 53, 54, 56
Diamine Bengal Blue R
Diamine New Blue G, R
Diamine Brilliant Blue G
Diamineral Blue *R, *CV, 3B, B
*Diamine Deep Blue B, R
Diamine Dark Blue B
Diamine Black BH, BHN, BHR
Diamine Fast Black F, X.

The dyestuffs marked with an asterisk (*) go very little on to the wool fibre even on prolonged boiling.

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3) Diamine Colours which dye the wool deeper than the cotton.	4) Wool Colours (Acid Colours) which in a neutral Glauber's salt bath go on to wool and which are used for shading the wool.
Diamine Gold	Naphtaline Yellow in crystals
Diamine Yellow CP	Indian Yellow G, R, FF
Diamine Orange F	Tropaeoline G, OO
Diamine Red 101J	Orange II, extra, ENZ, R
Diamine Violet Red	Azo Red A
Diamine Rose BD	Croceïne AZ
Diamine Scarlet B, 3B, RG	Roccelline
Diamine Bordeaux S	Wool Red B, BG
Diamine Brown B	Milling Red G
Diaminogene extra	Alkaline Blue 6B—3R
Diamine Jet Black OO	Formyl Blue B
	Brilliant Milling Blue B
	Brilliant Wool Blue RB
	Formyl Violet 10B, 8B, 6B, S4B, S5B, HW
	Alkaline Violet CA, C
	Lanacyl Violet B
	Lanacyl Blue BB, R
	Lanacyl Navy Blue B, BB
	Alphanol Blue BR extra
	Naphtol Blue G, R
	Brilliant Milling Green B
	Thiocarmine R
	Naphtol Dark Green G
	Naphtol Blue Black

Continuation page 151.

1) Diamine Colours which dye wool and cotton practically the same shade.	2) Diamine Colours which dye the cotton deeper than the wool.
Diamine Green 2209J, 2210J	*Union Blue Black 2340J
Diamine Dark Green N	*Oxy Diamine Black KW
Diamine Black HW	Oxy Diamine Black A, D, SA, US, BM
Oxy Diamine Black JE, JEI, JW, JWF, FFC, UI, SOOO	Para Diamine Black B, BB, FFB, FF extra conc.
Union Black S, P, BG, BB 3B, OJGJ, 1993J	*Diamine Jet Black CR, RB, SS.
Union Jet Black B	
Union Fast Black J	

The dyestuffs marked with an asterisk (*) go very little on to the wool even on prolonged boiling.

5) Diamine Colours which at a moderate temperature (about 50° C. or 120 deg. F.) go almost exclusively on to the cotton and may be used for shading in a warm dyebath.

Diamine Fast Yellow A, AR, AGG, B, FF	Diamine Sky Blue, FF, FFS
Diamine Orange G, D	Diamine Pure Blue A
Diamine Rose GD	Diamine Blue NC
Direct Rose T	Diamine Fast Blue G, FFB, FFG, BN
Oxy Diamine Red S	Diamineral Blue R
Diamine Purpurine 6B	Diamine Dark Blue B
Diamine Fast Scarlet GG, 4BN, 6BS, 6BGN, 8BN	Diamine Deep Blue R
	Diamine Black BH, BHN, BHR, RMW
Diamine Fast Brown G, R	Diamine Jet Black SS, RB, CR
Diamine Nitrazol Brown G	Oxy Diamine Black A, D, SA, US, NF
Diamine Catechine B	Para Diamine Black B, BB, FFB
Oxy Diamine Brown RN	Diamine Milling Black B conc., FG extra, FFB extra conc.
Diamine Heliotrope B, G, O	
Oxy Diamine Violet B.	

3) Diamine Colours which dye the wool deeper than the cotton.

See page 149.

4) Wool Colours (Acid Colours) which in a neutral Glauber's salt bath go on to wool and are used for shading the wool.

Continued from page 149.

Naphtylamine Black 6B, 4B, 4BN, X2B, X3B, D, BB, BBN, BBV, 3BV, R, RNB, NBB.
Naphtyl Blue Black N, FB, FBB
Neutral Wool Black G, B, 4B
Alphanol Black BG, R.

6) Diamine Colours which go well on to cotton in a cold bath and may be used for subsequently dyeing the cotton in unions wool-dyed in an acid bath.

Diamine Fast Yellow A, AR, FF, B, AGG
Oxy Diamine Yellow TZ, GG
Diamine Orange G, D
Diamine Rose GD, BD
Oxy Diamine Red S
Cotton Red A
Diamine Red 10B
Diamine Purpurine 6B
Diamine Violet Red
Diamine Nitrazol Brown G
Diamine Brown S
Oxy Diamine Violet B, G, R
Diamine Heliotrope B, G, O
Diamine Sky Blue, FF, FFS
Diamine Pure Blue A
Diamine Blue BB, 3B
Diamine Fast Blue FFB
Diamine Green G
Diamine Black BH, BHN, BHR, HW, RMW.

The subsequent dyeing of the cotton is done cold to lukewarm in as short a bath as possible as described on pages 157 and 158.

Directions for Dyeing by the One-Bath Method.

For union piece-goods, the ordinary wooden vat provided with a winch is used. The heating is best done by indirect steam because direct steam is apt to dilute the liquor too much. Dye-vats which have been used previously for working with acids should be well cleaned first by boiling with soda in order to neutralise the acid which has penetrated into the wood.

For deep shades the liquor should be as concentrated as possible (25 to 30 times the weight of the goods to be dyed), 2—4 lbs Glauber's salt crystals per 10 gallons liquor being added. The bath is first boiled up, and after shutting off steam, the goods are entered, run for 20—30 minutes without steam, and boiled for $^1/_2$ hour. The dyeings are then sampled to see whether up to shade or not; if the desired shade is not yet obtained and the wool and cotton are both still too pale, the requisite quantity of dyestuff is added to the liquor and the bath brought again to the boil, the goods being then worked for another $^1/_4$—$^1/_2$ hour. If the wool is still too light, dyeing is continued at the simmer, after adding a small quantity of wool dyestuff, until it has assumed the desired depth of shade. If on the other hand the cotton be lacking in depth of shade, the goods are simply left to feed in the cooling bath, such dyestuffs as dye the cotton deeper (Group 2) being added according to requirement.

For pale shades it is recommended to apply a different method, the well wetted out goods being entered at 50° C. (120 deg. F) into the bath charged with $^1/_2$—1 lb Glauber's salt per 10 gallons liquor, raising the temperature gradually to the boil, boiling from 20—30 minutes, and sampling. If the wool is dyed sufficiently deep and the cotton is deficient in this respect, some of the requisite cotton dyestuff is added, the goods being worked in the cooling bath, whilst if on the other hand the wool has not assumed the desired depth of shade, some of the wool dyestuff is added and the dyeing continued near boiling temperature.

When dyeing pale shades, the dyebaths become almost completely exhausted; in the case of medium and dark shades on the other hand a portion of the dyestuff remains in the bath which is preserved for subsequent lots.

It is recommended to keep separate vats for dyeing pale shades, brown, olive and similar shades, and others again for blacks and deep blues; if however there be reasons against keeping standing baths for the most current shades, the same liquor may be used repeatedly in a suitable rotation.

The amounts of dyestuff required for dyeing medium or dark shades in a standing bath are about $^3/_4$—$^4/_5$ of those used at first; the additions are dependent on the depth of shade, volume of liquor, and loss of liquor ensuing each time when lifting the goods. Thus the actual quantity required can only be determined exactly after dyeing the second or third batch.

Of Glauber's salt it is as a rule not necessary to add any more than one-fifth of the original quantity for subsequent lots, but the quantity may also be gauged according to the volume of water required for repleting the liquor, as for instance, about 2—4 lbs Glauber's salt crystals per 10 gallons water in the case of deep shades. Very deep dyeings such as claret, dark brown, dark blue and black should be thoroughly rinsed after dyeing, as they are otherwise apt to bronze during the drying.

Care should be taken not to dry deep shades at too high a temperature which likewise promotes the bronzing. Bronzy dyeings may easily be improved or corrected by rinsing subsequently in tepid water to which a little soap may if necessary be added.

If Diamine Colours do not by themselves yield sufficiently bright shades of blue, green, violet or claret, the dyeings may be topped with Basic Colours in a fresh liquor with the addition of 2—3 % acetic acid. If the Basic Colour is required to go on to the cotton only, the topping is done in a cold liquor, but if required to go more onto the wool, the bath must be heated gradually, for instance in the case of Diamond Magenta to 40—50° C. (105—120 deg. F.), and for Methyl Violet, Victoria Blue B, Brilliant Green, etc. nearly to boiling temperature.

Producing Dyeings Fast to Milling.

Union dyeings produced by the one-bath method possess as a rule very good fastness to washing and milling. If a higher degree of fastness to milling is demanded for *half-wool yarns* and *shoddy*, the following methods for fixing the colours come into consideration;

I. An aftertreatment with metallic salts.
   a) Bichrome or sulphate of copper alone,
   b) Bichrome and sulphate of copper combined,
   c) Chromium fluoride or chrome alum;

II. An aftertreatment with
   a) Formaldehyde or
   b) Formaldehyde and bichrome;

III. Coupling with Nitrazol,
IV. Diazotising and Developing with Phenylene Diamine or Beta Naphtol.

I. Aftertreatment with Metallic Salts.

The dyeings produced in a neutral bath are taken, without previous rinsing, into a second bath charged with 3—5 % acetic acid and the requisite metallic salts. If the dyebath is not to be used over again and deep shades are wanted, the aftertreatment may be carried out in the dyebath proper. The goods are treated for $^1/_2$ hour in this bath at 70—80° C. (160—175 deg. F.) and then rinsed.

The following dyestuffs come into consideration for the various methods of aftertreatment:

Diamine Fast Yellow A, B, FF, 3G Diamine Orange B, D, G Diamine Brown 3G, M, B Diamineral Brown G Oxy Diamine Brown G, RN Diamine Catechine B, G, 3G Diamineral Blue R, CV, B, 3B Diamine Dark Blue B Diamine Deep Blue B, R	aftertreated with $1^1/_2$ % sulphate of copper and $1^1/_2$ % bichrome, or with 3 % bichrome (alone);
Diamine Sky Blue FF Diamine Brilliant Blue G Diamine New Blue R Diamine Blue RW, BG Oxy Diamine Blue G, 3G, 5G, R	aftertreated with 3 % sulphate of copper;
Diamine Green G Diamine Fast Red F Diamine Bronze G	aftertreated with 3 % chromium fluoride, or 3 % chrome alum;
Diamine Jet Black SS, OO, Cr, RB Oxy Diamine Black BM, NF Union Black S	aftertreated with 3 % bichrome.

As suitable wool dyestuffs for shading which are fixed by, or stand the aftertreatment with, metallic salts well, we recommend the following:

Formyl Violet, all brands
Alkaline Violet C, CA
Brilliant Milling Blue B

Formyl Blue B
Brilliant Milling Green B
Anthracene Yellow C
Alphanol Black BG, R
Anthracite Black R, B.

II. Aftertreatment with Formaldehyde or with Formaldehyde and Bichrome.

This is suitable for the following dyestuffs:

Diamine Brown ATC, MR, S
Diamine Fast Brown G, R
Oxy Diamine Black JE, JEI, JB, JW, JWF
Oxy Diamine Black SA, A, D, US, UI
Para Diamine Black B, BB, FFB, FF extra conc.

The aftertreatment is carried out in a fresh cold to lukewarm bath with 3% formaldehyde or with 3% formaldehyde and 1% bichrome as well as 2—3% acetic acid at a temperature of about 70° C. (160 deg. F); or, if the bath is not to be used for subsequent lots, the aftertreatment may take place therein when the dyeing is completed. If formaldehyde and bichrome are used in conjunction with each other they yield dyeings of still better fastness to milling than are obtained with formaldehyde alone.

III. Coupling with Nitrazol.

Coupling with Nitrazol C is resorted to particularly for producing blacks of good fastness to milling and acids on shoddy or yarn dyed with *Oxy Diamine Black JW* or *JWF*.

After rinsing lightly, the goods are taken into a cold bath, as short as possible, charged with

3% Nitrazol C*
0,75% soda ash
0,2 % acetate of soda

} of the weight of the goods,

treated therein for 20—30 minutes, and rinsed.

Nitrazol C is dissolved by stirring it up with a little cold water, carefully crushing any lumps which may have formed and bringing completely into solution by pouring a sufficient quantity of cold water over it.

The coupling bath is first of all charged with the filtered Nitrazol solution, then with the soda and acetate of soda.

* The coupling may be effected equally well with diazotised Paranitraniline instead of with Nitrazol; for directions see Volume I, page 14.

Diazotising and Developing.

The diazotising and developing is applied in the production of dyeings on linings (Italians, serge) and ladies' dress materials (Jacquard, cashmere, orleans, half-wool yarn, half-wool shoddy, etc) which are required fast to washing, perspiration and acids.

The following dyestuffs are adapted for diazotising and developing:

For Black:

Diamine Black BH, BHN, BHR
Diamine Azo Black B
} developed with Phenylene Diamine;

For Dark Blue:

Diamine Black BH, BHN, BHR
Diaminogene Blue NB, NA, 3RN

For Red:

Primuline
Diamine Azo Scarlet A, B
} developed with Beta Naphtol.

For Claret:

Diamine Azo Bordeaux B
shaded if necessary with
Diaminogene Blue 3RN

When dyed singly by the one-bath method, none of the above-mentioned dyestuffs, with the exception of *Diamine Azo Scarlet A and B*, yield perfectly solid shades on the wool and the cotton; they have therefore to be shaded in the same bath with suitable wool dyestuffs, for which purpose the following are used:

For Black:

Naphtylamine Black 4B, 6B
Formyl Violet S4B
Indian Yellow G.

For Dark Blue:

Formyl Blue B
Brilliant Milling Blue B
Formyl Violet S4B
Brilliant Milling Green B

For Red:

Milling Red G
Rosazeïne B

For Claret:

Milling Red G
Formyl Violet S4B.

The cotton dyestuffs mentioned are dyed boiling hot together with the wool dyestuffs with the addition of 2 lbs Glauber's salt or common salt per 10 gallons liquor; then the goods are rinsed, and treated for 20—30 minutes in a fresh cold bath with

2—3% nitrite of soda and
6—9% hydrochloric acid or
4—6% sulphuric acid.

They are then rinsed quickly in cold water and developed cold in a fresh bath, for

black with 0,7% Phenylene Diamine dissolved with half its weight of soda ash, and

dark blue, red and claret with 1% Beta Naphtol dissolved with double that quantity of caustic soda lye of 77° Tw.

Diamine Azo Scarlet A and B are dyed at a temperature not higher than 70—80° C. (160—175 deg. F), at which they yield solid shades on both the wool and the cotton without any further shading being necessary.

B. Dyeing according to the Two-bath Method.

I. Dyeing the Wool previously and Cotton-dyeing subsequently with Diamine Colours.

The method is applied both for producing solid shades and for goods showing two-coloured effects; in the latter case the cotton is dyed a different shade than the wool.

Dyeing the wool previously. According to the requirements made for fastness, the wool is dyed either with easily levelling dyestuffs, Acid Colours fast to milling or with Chrome Colours, according to the particulars in the tables on pages 68—79 regarding the dyeing of woollen piece-goods.

Subsequent dyeing of the cotton After the dyeing in the acid bath, the goods are well rinsed, the cotton being dyed in a fresh cold to lukewarm liquor with the Diamine Colours mentioned further on In addition to the dyestuff necessary (3/4—8 oz per 10 gallons liquor), 1/2—2 lbs Glauber's salt crystals and 3/8—3/4 oz soda ash per 10 gallons liquor are added according to the depth of shade required. This is done in a short bath, either in the washing machine, jigger or a dye-vat.

The following are the Diamine Colours best suited for subsequently dyeing the cotton portion of union goods which have been wool-dyed in an acid bath:

Diamine Fast Yellow A, AR, AGG, B, FF	Diamine Nitrazol Brown G Diamine Brown S
Oxy Diamine Yellow TZ, GG	Oxy Diamine Violet B, G, R
Diamine Orange G, D	Diamine Heliotrope B, G, O
Diamine Rose GD, BD	Diamine Sky Blue, FF, FFS
Oxy Diamine Red S	Diamine Pure Blue A
Cotton Red A	Diamine Blue BB, 3B
Diamine Red 10B	Diamine Fast Blue FFB
Diamine Purpurine 6B	Diamine Green G
Diamine Violet Red	Diamine Black BH, BHN, BHR, HW, RMW.

If the wool has been dyed previously with Fast Yellow S, Orange GG, Acid Magenta, Acid Violet 4RS, Acid Green extra conc., extra conc. B, 5G, or Water Blue B, R, RB, the goods have to be cotton-dyed subsequently without soda and after rinsing soured off lukewarm with acetic acid. Rinsing with acetic acid is in any case to be recommended unless Cotton Red A or Diamine Red 10B were used for covering the cotton.

In the case of blacks or of dark shades like blue, green, brown, etc., the subsequent dyeing of the cotton portion of union goods is usually carried out with

Diamine Black RMW
sometimes in combination with
Diamine Black BH

in the washing machine.

For very bright shades the cotton covered with Diamine Colours may be topped with Basic Colours or may be dyed straightaway with Basic Colours after having been suitably mordanted. In the latter case the goods previously dyed with Acid Colours are mordanted for 2–3 hours or overnight in a cold to lukewarm bath with 2–5% tannic acid according to the depth of shade, hydroextracted or squeezed off well, fixed for 20—30 minutes in a fresh, cold bath containing 1—2½% of some antimony salt, rinsed well, and dyed cold with Basic Colours with the addition of 2—4% acetic acid. Any of the Basic Colours may be used for this purpose (see page 14.)

The goods are then rinsed; they may be soaped lightly if necessary in order to remove bronziness caused by the Basic Colours on the wool, and rinsed again.

II. Dyeing the Cotton previously with Diamine Colours and the Wool subsequently with Acid Colours.

a) Cotton-dyeing previously in the Jigger or in the Vat:

For this purpose a number of blacks are well suited which can be used for bottoming blacks, dark blues, dark greens and dark browns.

Amongst these are the following:

Para Diamine Black B extra conc., BB extra conc., FFB extra conc.

Oxy Diamine Black UI extra conc., US extra conc., SA extra conc.

Diamine Milling Black B conc., FG extra, FFB extra conc.

For Scarlets and Reds,

Diamine Fast Scarlet GG, 4BN, 6BGN

may be used.

Charge the dyebath, which should be as short as possible and have a temperature of 50—60° C. (120—140 F.), with 3—4% dyestuff, 2 lbs Glauber's salt crystals and $^3/_4$—$1^1/_2$ oz soda ash per 10 gallons liquor, and dye the goods in the same for $^3/_4$—1 hour, then rinse and cross-dye as required in an acid bath as indicated in the tables for wool piece-dyeing (pages 68—79); then rinse well.

In cross-dyeing care has to be taken that the bath reacts distinctly acid at the dyeing operation The whole amount of acid necessary for exhausting the dyestuff is therefore added at once when preparing the bath; the goods are then entered in the wet state into the moderately warm bath, which is raised gradually to the boil, boiling being continued until the liquor is exhausted. An addition of 5—10% alum is very beneficial. If the liquor be insufficiently acid, the dyestuff is apt to boil off from the cotton again and to go on to the wool.

b) Dyeing the Cotton previously in the Milling Machine.

The cotton may also be dyed without resorting to a special dyeing operation, by charging the soap solution used for milling with the solution of the cotton dyestuffs mentioned under (a) and milling the goods with this dyestuff and soap solution in the ordinary manner.

As a brown, Diamine Nitrazol Brown G may be used, being afterwards coupled with Nitrazol in the subsequent rinsing water according to the directions on page 155.

After the milling, the goods are rinsed in the usual manner and cross-dyed if necessary in an acid bath as indicated under (a) on the preceding page.

If cross-dyeing is not to be resorted to, any of the Diamine Colours, and particularly those indicated for cold-dyeing on page 151, may be used.

c) Dyeing the Cotton previously with Diazotised Black, Blue, Red and Claret.

Dye in the jigger or in the vat with the dyestuffs indicated on page 156 at a temperature not higher than 50—60° C. (120—140 deg. F.) in order not to stain the wool too much; rinse, diazotise, develop, rinse again, and cross-dye with acid wool dyestuffs in a fresh boiling bath.

Besides for plain goods, this method is also employed frequently for two-coloured styles, by dyeing the wool in an acid bath to any desired shade after having cotton-dyed the pieces.

Black, for example, is cotton-dyed previously with

5—6% Diamine Black BH, BHR, BHN or with Diamine Azo Black B } for the starting bath

with the addition of

2 lbs Glauber's salt crystals
3/8 oz soda ash } per 10 gallons liquor

for 1 to 1 1/2 hour at 50—60° C. (120—140 deg. F.) The goods are then rinsed cold, and (as indicated on pages 156—157) diazotised and developed with Phenylene Diamine, or with a combination of Phenylene Diamine and Beta Naphtol.

For plain shades of black, the wool is then cross-dyed with

Naphtylamine Black 4B, 6B, X3B (Method III, page 6)

or with the following brands which have to be dyed in a strongly acid bath:

Naphtylamine Black ESN, ES3B, ES5B, etc.
Naphtylamine Blue Black B, 5B } Method II, page 5

For two-coloured styles, the wool may be cross-dyed at will with any Acid Colour desired.

Navy Blue and Blue

are dyed with

Diamine Black BH, BHR, BHN
Diaminogene Blue NB, NA, 3RN
Diamine Azo Blue RR

in the manner indicated for black, diazotised, and developed with Beta Naphtol.

For cross-dyeing in the production of solid shades, either

Alphanol Blue BR extra (Method V, page 8)
Lanacyl Blue BB, R } Method III, page 6
Lanacyl Navy Blue B, BB

or the easily levelling dyestuffs

Azo Wool Blue SE, SER
Azo Navy Blue B, 3B
in combination with
Acid Violet } all brands
Formyl Violet
} Method I, page 4

may be used.

For two-coloured effects, the cotton should not be dyed too hot in order to prevent the wool from absorbing too much dyestuff; the wool may be topped at will in varying shades with any of the Acid Colours.

Red and Claret:

Dye with
Primuline
Diamine Azo Scarlet A, B
Diamine Azo Bordeaux B
saddened if necessary with
Diamine Azo Blue RR

and the same ingredients as for black; Primuline and Diamine Azo Scarlet, which go easily on to the wool, are dyed at about 40—50° C. (105—120 deg. F), Diamine Azo Bordeaux at about 60° C. (140 deg. F).

After dyeing, the goods are rinsed lightly, diazotised, and developed with Beta Naphtol as indicated on page 157.

For cross-dyeing the wool portion in the case of solid shades of red, the following products are used:

Lanafuchsine SB, SG, Method I, page 4.
Naphtol Red EB, C } Method II, page 5.
Azo Rubine A

For two-coloured styles, the cotton portion of which is to be dyed previously to red or claret shades, Primuline and Diamine Azo Bordeaux B come into consideration in the first place, but must not be dyed at too high a temperature. The wool is then usually dyed green or blue with Acid Colours which dye very bright shades; in some cases too the wool is dyed black.

III. Wool-dyeing previously with Dyestuffs Fast to Milling and Cotton-dyeing subsequently with Immedial Colours.

This process is of particular value for the production of dyeings fast to milling on half-wool yarns and on uncarbonised shoddy.

The wool is first dyed as customary for loose wool (see Tables, pages 20—31) with Chrome or Acid Colours fast to milling, the goods being then thoroughly rinsed and cotton-dyed with Immedial Colours.

The Immedial Colours are dissolved by boiling for 10—15 minutes with their own weight of sodium sulphide and double their weight of glucose. This solution is added to the lukewarm dyebath, and after adding 3 oz soda ash and, according to the depth of shade, $^1/_2$—3 lbs Glauber's salt crystals per 10 gallons liquor, the goods are entered at a temperature of about 30—40° C. (85—105 deg. F). In this bath the goods are worked thoroughly and then left for 2—4 hours, or overnight in the case of goods difficult to penetrate, without heating any further. Yarn is then wrung off thoroughly, shoddy thrown out, so that the liquor running off flows back into the bath, whereupon they are rinsed well and soured off with acetic acid. If Immedial Black or Immedial Carbon be used for the cotton-dyeing, the goods should be aftertreated with $4^1/_2$—8 oz acetate of soda per 10 gallons liquor according to the directions on page 214.

When dyeing in a standing bath, only $^1/_4$—$^1/_3$ the quantity of glucose as of sodium sulphide is added besides the reduced quantities of dyestuff and sodium sulphide then required.

Instead of glucose, either borax or Immedial Intensifier C may be used to equal advantage. In each case the Immedial Colour is dissolved together with the sodium sulphide, the solution added to the liquor and then of the borax or Immedial Intensifier C half as much again as of sodium sulphide together with the requisite quantities of soda and Glauber's salt. The dyeing is carried out in the liquor prepared in this manner exactly as described for working with glucose.

The Immedial Colours suitable for the process will be found enumerated in the tables on pages 194—205.

IV. Cotton-dyeing previously with Immedial Colours and Wool-dyeing subsequently with Wool Dyestuffs.

The method indicated under III may be carried out in the reversed order, the cotton being dyed first with Immedial Co-

lours and the wool then cross-dyed in an acid bath. Such method of working is to be recommended particularly for piece-goods, the wool portion of which may then be cross-dyed with Acid Colours of good fastness to light and perspiration.

The process offers advantages for the dyeing of piece-goods, and particularly for blacks, blues and browns as well as for two-coloured styles, because it yields fast dyeings with a very good firm handle. The dyeing is best done in a jigger provided with squeezing rollers; if correspondingly stronger dyebaths be used the well-known continuous machines may likewise be employed.

Stripping of dark Shoddy, Shoddy Materials and defectively dyed Goods.

To dye dark shoddy and shoddy materials in lighter shades, it is necessary to first strip the old colours off the material. The stripping agents most frequently employed are the following:

1. Soda. The desired effect is frequently obtained simply by a treatment with soda, particularly if light-coloured material is only to be improved a little.

The goods are treated for 20 minutes with

5—10% soda

at about 50° C. (120 deg. F.), rinsed well, and then dyed. If the goods stripped in this manner are given a further treatment as described on page 164 under (3), considerably better results are obtained.

If it is desired to reduce shades which have come out too dark, it is frequently found quite sufficient just to treat the dyeings in hot water to which a little soda or ammonia may be added in order to increase the effect.

2. Sulphuric Acid. Wood Colours may be stripped to a sufficient extent by boiling with sulphuric acid. The stripping may be combined with the dyeing process, by dyeing the Acid Colours in the customary manner and adding another 6—8% sulphuric acid when the bath is exhausted, the boiling being then continued for another $^1/_2$—$^3/_4$ hour.

By the subsequent boiling in the strong sulphuric acid bath the dark bottom of the material is destroyed for the greater part, and a brighter and more level dyeing results than would be the case without such subsequent boiling.

3. Bichrome and Sulphuric Acid. This method is frequently applied for such kinds of shoddy and shoddy cloth as are not sufficiently stripped by soda or sulphuric acid alone.

Boil for $^1/_2$—$^3/_4$ hour with

3—6 % bichrome and
6—12% sulphuric acid, adding to advantage also
3—6 % oxalic acid.

After stripping, rinse well, neutralise if necessary, and rinse.

In some instances the bichrome and sulphuric acid bath is also used for dyeing; the dyestuffs suitable for this purpose are indicated on page 190.

4. Hyraldite Z for Stripping. If the stripping with bichrome and sulphuric acid is not effective enough or the yellowish ground cannot be stripped sufficiently by a subsequent treatment with bisulphite so as to permit of the desired shade being produced, Hyraldite should be employed as the most efficient agent.

The stripping with Hyraldite ist best done in wooden vats. Copper vessels have no effect on the stripping, but are apt to cause spots on the goods.

Charge a bath of 40—50° C. (105—120 deg. F.) with

2—4 % Hyraldite Z for Stripping* and
2,5—5,5% formic acid 85% or
1—2,5% sulphuric acid
} of the weight of the goods;

enter the goods, raise gradually to the boil in the course of $^1/_2$—$^3/_4$ hour, and boil for 20—30 minutes. Then rinse thoroughly, neutralise if necessary, and rinse once more.

The amount of Hyraldite to be used is dependent upon the depth of shade and the properties of the dyeings to be stripped as well as upon the extent to which the stripping is to take place.

Hyraldite is likewise employed for the stripping of *goods that have been dyed defectively or too deep a shade*, in case

* Hyraldite A or C extra may be used just as well as Hyraldite Z for Stripping, the quantites required being:

5—10% A or 2,5—5% Hyraldite C extra with
5—10% acetic acid 30% or bisulphite of 64° Tw.

a treatment in hot water, to which a little soap or ammonia may if necessary be added, should not be found sufficient.

Bleaching of Unions.

Union goods are bleached either with a view to obtaining a pure, clear white to be marketed directly, or for the production of pale, bright shades which it would not otherwise be possible to obtain on ordinary scoured material.

The bleaching is effected:

1. By stoving in a sulphur stove.
2. With permanganate and bisulphite.
3. With peroxide of hydrogen or peroxide of sodium.

1. Stoving.

This is the cheapest method and is applied both in the production of pure white goods and of bright, pale shades.

The goods, which have been cleaned very thoroughly beforehand with soap, are hung up damp overnight in a suitable wooden box or in a room with brick walls where they are exposed to the fumes of burning sulphur, care being taken that air is admitted in sufficient quantity at the bottom. When large quantites are stoved regularly, arrangements may be made for working continuously.

When the bleaching is completed, the goods are rinsed in cold water and dried by hanging up in an airy place.

2. Bleaching with Permanganate of Potash and Bisulphite of Sodium.

Prepare a cold bath in a clean wooden vat, to which add a solution of 2—4% permanganate of potash (reckoned on the weight of the goods) prepared in lukewarm water. Enter the well cleaned goods damp, and run for $^1/_2$ hour, or a little longer if necessary, until they have assumed a uniform deep brown shade. Then rinse lightly, and enter into a warm bath containing 1—2 gallons bisulphite of sodium and $^1/_{10}$ to $^1/_5$ gallon sulphuric or hydrochloric acid per 100 gallons; leave the goods in this liquor until the brown colour has disappeared entirely, then sour off lightly, and rinse well.

The goods should be dried slowly and at a moderate temperature.

3. Bleaching with Peroxide of Hydrogen or Peroxide of Sodium.

The best and most permanent white is obtained with peroxide of hydrogen or peroxide of sodium.

Prepare the bleaching bath with 4—5 parts cold water and 1 part peroxide of hydrogen, adding a little ammonia or silicate of soda to render it slightly alkaline. Enter the well cleaned material, give a few turns, raise the temperature gradually to 40—50° C. (105—120 deg. F.), and leave the goods standing for 6—8 hours or overnight, care being taken that they are well covered by the bleaching liquor all the time. Then lift the goods, and sour off weakly, adding a little bisulphite of potash if necessary; then rinse, and dry slowly.

Peroxide of sodium may be used in the place of peroxide of hydrogen, as follows:

For every 10 gallons cold water add
10½ oz sulphuric acid and after stirring well add gradually
8 oz peroxide of sodium while stirring continually.

The bath, which should be slightly acid, is rendered slightly alkaline by adding a very small quantity of ammonia or silicate of soda (red litmus paper should turn slightly blue.) Enter the goods, raise the temperature to about 50° C. (120 deg. F.), and leave the goods for some hours in the bleaching bath, care being taken that they are covered well all the time by the bleaching liquor.

After lifting, sour off, and rinse.

N.B. The peroxide of sodium should be added to the bath in small quantities only while stirring well continually. Only perfectly dry vessels should be used for weighing out; paper should not be used for the purpose.

Methods of Dyeing applied for the most important Union Materials.

Gentlemens' Suitings (Worsted Cloth, Cheviot, etc.)

These materials are for the most dyed according to the one-bath method with the combinations of dyestuffs indicated in the Tables, pages 194—205.

In some instances, particularly when the requirements for fastness are very exacting, the two-bath method (cotton-dyeing with Immedial Colours and cross-dyeing with Acid Colours) is likewise applied; by this method a very

pleasant handle is at the same time imparted to the goods. (For method of dyeing see page 162.)

Union worsteds, particularly such with white and coloured effects threads, may also be produced by weaving undyed wool and cotton dyed with Immedial Colours along with shot effects dyed fast to acids, and cross-dyeing the wool in an acid bath. For dyeing instructions and for a list of the wool dyestuffs adapted for this purpose see Tables, pages 68—79. The following dyestuffs are used for blues and blacks, which are the shades which come mostly into consideration:

For Blue

Lanacyl Blue BB, R
Lanacyl Violet B
*Lanacyl Navy Blue B, BB
*Azo Merino Blue 3G, G
*Azo Merino Dark Blue R
Peri Wool Blue B, BG, G*
} Methods II and III, pages 5 and 6;

these may be used both for plain goods and for goods with shot effects. For more exacting requirements with regard to fastness to perspiration,

*Azo Chrome Blue T, TB
*Anthracene Chrome Blue F, G, BB, B, R, FR
*Anthracene Acid Blue BB, 3B, BBN, RT
} Methods VIII and IX, pages 9 and 10.

are used for blues; with the exception of Anthracene Chrome Blue BB and G these may be used also for goods with effect threads.

For Black:

Any of the Naphtylamine Blacks may be used on plain goods. The following are used in the first instance for goods with effect threads:

*Naphtylamine Black EFF, ESN, ES3B, ES5B, ES8B
*Naphtylamine Blue Black B, 5B
} Method II, page 5.

For Blacks with very good fastness to perspiration:

Alphanol Black BG, R, Method V, page 8.
*Anthracene Chrome Black, all brands
Anthracene Acid Black SR*, SBB*, DSF, DSN, DSFB
} Methods VIII and IX, pages 9 and 10.
*Naphtyl Blue Black N
*Naphtylamine Black R
} dyed with the addition of sulphate of copper, Method IV, page 7.

* The dyestuffs mentioned are all sufficiently fast to steaming and perspiration for ordinary requirements, those marked with an asterisk (*) resist even severe steaming (decatising).

and for goods with effect threads:

* Naphtylamine Black Cr, CrN
* Anthracene Acid Black ST, SR, SRT } Methods VIII and IX, pages 9 and 10.

It is well to use acetic or formic acid instead of sulphuric acid in cross-dyeing the wool with Acid Colours in order to avoid any possible weakening of the cotton fibre by mineral acids. As a rule, 5—10 % acetic acid of 8° Tw or 1,5—3 % formic acid 85 % are sufficient.

After dyeing, the goods should be well rinsed and treated finally in a bath containing 8 oz acetate or formate of soda per 10 gallons water, after which they are dried without rinsing again.

Ladies' Costume Cloths, Meltons, Presidents.

These kinds of goods are usually dyed according to the one-bath method. There is a demand for meltons and ladies' costume cloths in all kinds of fancy shades from pale to dark also black, for which the combinations given under (a) and (b) in the Tables, pages 194 – 205, are used. Very well suited for the pale grey, mode and drab shades so much in demand are the following:

Combinations of
Diamine Dark Blue B
Diaminogene extra, B
Diamine Fast Blue FFB
Lanacyl Blue BB, R
Diamine Orange B
Diamine Catechine B
Diamine Fast Yellow B.

Presidents produced from mungo and shoddy are with few exceptions dyed black. This kind of goods contains in addition to the white cotton warp a good deal of cotton on the face and on the wrong side which it is necessary to cover effectively. Preference is usually given to greenish blacks, which are dyed with

Union Black OJGJ, or
Oxy Diamine Black JE, JB
in combination with
Formyl Blue B
Brilliant Milling Green B.

The blacks mentioned are particularly well adapted for the dyeing of presidents because they are very little apt to bronze even when dyeing the cotton to the requisite very deep shades.

* See note at foot of previous page.

Flannelette and Imitation Lambskin.

These materials are usually dyed by the one-bath method with combinations of the dyestuffs mentioned in the Tables, pages 194—205.

The bright shades required for these kinds of goods are obtained in the following manner:

Scarlet is dyed with

2—3% Diamine Scarlet B
in combination if necessary with
0,5—0,8% Rosazeïne B,

blue tones with Diamine Scarlet 3B, at a temperature near boiling point. The goods may if necessary be boiled for some time when using Diamine Red 4B, 6B, or Diamine Fast Scarlet GG, 4BN along with Diamine Scarlet.

Bright yellow shades are obtained with

3—4% Thioflavine S
in combination with
1—1,5% Naphtol Yellow S,

dyeing at a temperature of 50° C. (120 deg. F.) with the addition of 2% acetic acid and 2—4 lbs Glauber's salt per 10 gallons liquor.

Pale and medium Blues are dyed with combinations of

Diamine Sky Blue, FF, FFS
Diamine Pure Blue A
Diamine Blue 2B, 3B
Diamine Brilliant Blue G
Formyl Blue B
Brilliant Milling Blue B
Alkaline Blue 6B—3R

with the addition of Glauber's salt, the goods being topped if necessary with

New Methylene Blue
Victoria Blue

in a fresh bath with the addition of a little acetic acid. When applying Alkaline Blue, the goods must after rinsing be soured off in a weak sulphuric acid bath and then rinsed again.

Bright violet shades may be produced by dyeing with

Diamine Violet N
Diamine Heliotrope B, O, G
Diamine Brilliant Blue G

with the addition of Glauber's salt and topping with

Methyl Violet
Diamond Magenta.

For topping, 3—4 % acetic acid are added, the goods being entered cold and the temperature gradually increased for colouring the wool.

Pink is dyed with

Diamine Rose GD, BD
Direct Rose T
shaded with
Rosazeïne B, 6 G
Irisamine G
Erythrosine B, D

with the addition of 10—20 % Glauber's salt and 1 % acetic acid at 40—50° C. (150—120 deg. F).

Particularly clear and bright pale shades are frequently dyed on these goods as so-called "Sulphured Colours"; for this purpose the following dyestuffs are very well suited:

Cream:

Diamine Yellow CP
Diamine Fast Yellow B, FF, A
Diamine Orange F, G, D
shaded with
Indian Yellow G, FF
Paraphosphine G, GG
Diamond Phosphine GG
Rosazeïne B, 13
Irisamine G.

Pale Yellow:

Thioflavine S
Oxy Diamine Yellow GG, TZ
shaded with
Thioflavine T, TCN.

Pink:

Diamine Rose GD, BD
Direct Rose T
shaded with
Rosazeïne B, 13
Irisamine G
Erythrosine B
Rose Bengale extra N.

Pale Blue and Pale Green:
Diamine Sky Blue, FF, FFS
Diamine Pure Blue A
Thioflavine S
shaded with
Formyl Blue B
Brilliant Milling Blue B
Victoria Blue B
New Methylene Blue N
Brillant Milling Green B
Thioflavine T, TCN

Violet:
Diamine Violet N
Diamine Heliotrope B, O, G
shaded with
Methyl Violet 3 B—6 B
Crystal Violet 10 B.

Dye for $^1/_2$—$^3/_4$ hour at 40—50° C. (105 – 120 deg. F.) with the addition of

5% Glauber's salt or
3—8 oz Glauber's salt } per 10 gallons liquor,
3—8 oz soap }

or of

3—8 oz soap alone per 10 gallons liquor,

hydroextract well, stove in the sulphur stove, best overnight, rinse lightly in a cold bath, and finally dry in the air.

Goods which are dyed with the addition of Glauber's salt only are best passed through a cold soap bath and whizzed again before being introduced into the stoving chamber.

Orleans and Lustre Goods.

The chief consideration, with a view to producing satisfactory results in the case of goods consisting of a cotton warp and a weft of lustrous worsted or mohair yarn, is a suitable treatment in the preparing process. Among the points to be observed are an even, perfectly straight rolling of the pieces, free from any creases, on to the rollerson which they are soaked, crabbed and steamed, as well as a careful singeing and steaming.

The steaming roller should not be perforated its whole length but a little less than the width of the goods; the roller should be covered with a few layers of coarse linen cloth and the rolled up piece should be wrapped with a back cloth.

For the preparing, Orleans and lustre goods are rolled firmly and evenly on to a roller in lengths of about 200—250 yards and crabbed without roller pressure in the crabbing machine in boiling water with the addition of ammonia and soap. They are then passed through the next box filled with cold water, passing below the upper roller, without pressure, and are rolled on to the cylinder for the steaming. After the steam has penetrated the goods evenly, it is allowed to pass through for another 5 minutes, whereupon the goods are either left to cool on the cylinder or for cooling passed through cold water. When dry, they are singed on the plate-singeing machine.

The dyeing is effected either by the one-bath method or in two or more baths.

Pale shades are dyed boiling hot by the one-bath method in a neutral Glauber's salt bath, or, as is frequently done, by simply padding with Diamine or Basic Colours in a lukewarm bath.

In the production of *medium shades*, the wool is usually dyed in an acid bath, the cotton being dyed with Diamine Colours in a weakly alkaline Glauber's salt bath, or with Basic Colours on a tannin and antimony or a sumac and iron mordant.

The cotton dyeing with Diamine Colours is described on page 157.

For cotton dyeing with Basic Colours, the goods, which have been wool-dyed in an acid bath, are treated in a cold to lukewarm bath for 2—3 hours or overnight, in the case of pure clear shades with 2—5 % tannin, or of covered flat shades with 5—15 % sumac extract of 51° Tw, or with a decoction of sumac leaves. They are then squeezed off well or whizzed, and turned for 20—30 minutes in a cold bath with 1—2½ % antimony salt or in a ½—3° Tw. liquor of nitrate of iron. After rinsing well, the goods are dyed to shade with Basic Colours in a cold bath with the addition of acetic acid, and rinsed once more thoroughly.

For dark shades and blacks the one-bath method comes less often into consideration. On the other hand the cotton is frequently dyed first with Diamine Black in the jigger, especially for blacks, then diazotised and developed as indicated on page 160, the wool being dyed in a boiling acid bath with the dyestuffs indicated on pages 160 and 161.

Orleans and lustre goods are also frequently produced with warps dyed fast to acids into which there may have been white or coloured cotton effects worked up.

In such case of course only the wool is cross-dyed, for which purpose dyestuffs should be selected which do not stain the white cotton effects (see tables on pages 68—79); after dyeing, the goods should be well rinsed. To the last rinsing bath $4^1/_2$—8 oz acetate or formate of soda per 10 gallons of liquor are added.

Union Cashmere.

With this fabric, which consists of a cotton warp and a soft woollen weft, good results are dependent upon a correct preparing.

The goods are first of all singed on the plate or the gas-singeing machine, then crabbed. For this purpose the goods rolled list upon list are treated for 15—20 minutes without pressure in boiling water to which a little soap or soda may if necessary be added, whereupon they are run in another hot bath on to the lower of a pair of rollers in a second trough where they are treated in the same manner as in the first. They are then passed through cold water, washed in the washing machine, rolled up smoothly, and steamed for 2—3 minutes in order to remove any creases caused by the washing.

The goods prepared in this manner are dyed either in one bath or by the two-bath method. The one-bath method is usually followed for dark shades, particularly for blacks, pale shades being obtained to better advantage by wool-dyeing in an acid bath and covering the cotton subsequently with Diamine Colours. (For method of dyeing see page 157.) Dark shades such as black, dark blue, dark brown, dark green etc. on the other hand are frequently dyed by the two-bath method by cotton-dyeing with blacks fast to acids such as Para Diamine Black B, BB, FFB, or Oxy Diamine Black US and UI (method of dyeing on page 159), or with a diazotised and developed black (page 160), and dyeing the wool subsequently with Acid Colours to any desired shade.

In the case of blacks a harder handle is frequently required than is obtainable by the aforementioned method, and a certain increase in the weight through the dyeing process is likewise expected. These results can be obtained by cotton-dyeing with a direct black fast to acids or dyeing according to the diazotising process, and covering the wool subsequently in the following manner:

Charge the bath with

2,5—3 % oxalic acid
2—2,5% Napthyl Blue Black N
1 % Naphtol Blue Black
7—10 % sumac extract
10 % Glauber's salt crystals, and a little Formyl Violet or Formyl Blue B according to requirement.

Enter into the bath hot, raise to the boil, and boil for about an hour; then add

1—2% sulphate of copper and
3—5% copperas,

and treat for another $^1/_2$ hour without any further boiling, whereupon rinse thoroughly.

In subsequent dyeing, the precipitate which has formed is first dissolved by an addition of oxalic acid; the Glauber's salt and dyestuff are then added, together with 4—5% sumac extract. The procedure is the same as for the first lot.

For cheap articles the cotton-dyeing previously may be substituted by dyeing the cotton subsequently with one-dip logwood black (as indicated on page 177) in combination with Naphtyl Blue Black or Naphtylamine Black. After dyeing, the goods are very thoroughly rinsed.

When dry, the goods are singed again if necessary, rinsed once more, squeezed off well (low-class goods are given a finish with gelatine or dextrine with the addition of a little glycerine), dried, and pressed.

Union Linings, Italians, Serges, etc.

The goods are first singed on the plate or gas-singeing machine, then crabbed boiling hot under pressure, if necessary with the addition of a little soda, rolled on to the steaming cylinder, steamed for 10 minutes, cooled off, rolled afresh, and steamed again.

The goods, which are now ready for dyeing, are dyed all kinds of shades, but principally black. The dyeing may be carried out either by the one-bath method or in two or more baths.

Black is dyed by the one-bath method with the various

Oxy Diamine Black brands A, D, JB, JW, FFC, BM, etc.
Para Diamine Black B, BB, FFB, FF extra conc.
Union Black S, P, BG, BB, 3B etc.

in combination as required with

Naphtylamine Black 4B, 6B, X2B, X3B
Alphanol Black BG, R
Naphtol Blue Black
Naphtol Dark Green G
Brilliant Milling Green B
Formyl Blue B
Formyl Violet S4B.

The dyeing is carried out in a short bath as customary with other union goods; it is recommended, particularly for *blue-black*, to boil first for $^1/_2$—$^3/_4$ hour with Naphtol Blue Black or Naphtol Dark Green G with the addition of Glauber's salt, and after shutting off steam to add

Union Black S or Oxy Diamine Black BM

or for cheaper articles

Oxy Diamine Black A, D
Para Diamine Black B, BB, FFB, FF extra conc.

For example, the goods are boiled for $^1/_2$—$^3/_4$ hour with
0,6% Naphtol Blue Black
0,5% Formyl Violet S4B

and 2 lbs Glauber's salt crystals per 10 gallons liquor, and, after shutting off steam,

4—5% Oxy Diamine Black BM
0,25 % Diamine Fast Yellow A

are added and the goods run for $^3/_4$ hour. If the wool is then still too pale, but the cotton dyed sufficiently, the bath is brought once more to the boil, boiling being continued until the requisite depth of shade is attained.

For *jet blacks*, a similar method of procedure is adopted but with smaller quantites of Naphtol Blue Black and Formyl Violet, and increased quantities of Oxy Diamine Black or Para Diamine Black, or, to simplify matters, all the quantities of dyestuff required may be added at once, the dyeing being carried out in the usual manner.

After dyeing, the goods are immediately rinsed cold and then treated for $^1/_2$ hour with 3% bichrome and $^1/_4$—$^1/_2$% sulphuric acid at about 50° C. (120 deg. F.) in order to render the colour resistant to the subsequent operations such as steaming and crabbing. If the goods are crabbed only lukewarm or not at all, and merely wet-steamed, it is sufficient to treat

them lukewarm with 3—5% neutralised alum* in a dye-vat or in two passages on the padding machine with 3—4½ oz. neutralised alum per 10 gallons liquor.

Care has to be taken that the goods are rolled upon back cloths of sufficient length and width and that the ends too are covered with a sufficiently long and broad piece of back cloth; the back cloths should furthermore be dyed and treated in exactly the same manner as the goods, as otherwise the ends of the pieces are apt to turn out lighter in colour. The steaming must furthermore only be maintained until all the fluid is removed from the roll; if the goods are treated correctly, the waste water flowing off will be well-nigh colourless.

When cold, the steamed goods are singed on the plate-singeing machine, rinsed once more on the padding machine, and finished, according to their quality, with

1—2 lbs dextrine
½ lb gum tragacanth
1—2 lbs glucose
3—5 lbs sulphate of magnesia

} per 10 gallons water,

dried on the tentering frame, cropped again, and pressed.

This one-bath black finished as indicated has the advantage over black produced in two or more baths of simpler method of production, which is quite a consideration when turning out large quantities.

If a weighted black with a scroopy handle is required, goods dyed by the one-bath method are rinsed and treated for about an hour in a jigger with 8—5 lbs sumac extract per 10 gallons; they are then left lying for several hours, given a bath of pyrolignite of iron or with a mixture of pyrolignite and nitrate of iron, rinsed well, and finished off.

By this method of working, goods with a much firmer and more scroopy handle may be obtained than by simply applying the one-bath method, without entailing much extra labour, the cotton being at the same time dyed a very deep shade. A light finish with dextrine or glue may in such case be given if required.

Another way of obtaining a black with a scroopy handle is to first dye the cotton in a bath of 50—60° C. (120—140 deg. F) with a black fast to acids (Oxy Diamine Black US, UI, SA, Para Diamine Black B, BB etc, see page 159) and to

* Neutralised alum is produced by adding soda gradually to a solution of alum until the precipitate caused by the soda no longer dissolves on stirring.

wool-dye subsequently by the method with Naphtyl Blue Black N and sumac (same as indicated for cashmere, page 173), or with one-bath logwood black in combination if necessary with Naphtylamine Black.

For this purpose charge a boiling hot bath with 4—6% logwood extract, 5% copperas, 3% sulphate of copper and a sufficient quantity of oxalic acid (2—3%) to cause the black liquor to assume a yellowish to brownish colour. Hereafter add the requisite quantity of Naphtyl Blue Black N or Naphtylamine Black R, and a little Formyl Violet S4B, if necessary; enter the goods, boil for 1/2—1 hour, then add a little ammonia or soda (1/2%—1%), and treat for another 1/2 hour without heating the bath any further.

In cases where particularly good fastness to perspiration and a very good handle are required, Italians and serges are best dyed black by first using a diazotised black like Diamine Black BH, BHN, BHR, in the jigger, and developing with Phenylene Diamine (see page 160). The wool is then dyed with a Naphtylamine Black or Naphtylamine Blue Black, or again with Anthracene Acid Black ST, SRT, which latter are particularly distinguished for their fastness to perspiration, in accordance with the particulars given on pages 78 and 79.

Still superior results can be obtained on the cotton of such goods by cotton-dyeing with Immedial Black, the recipe for which is given on page 162. The wool is subsequently dyed in accordance with the before-mentioned directions.

Italians and serges (with or without effect threads), the warp of which has previously been dyed with colours fast to acids, only require to be wool-dyed. For blacks with effect stripes, Naphtylamine Black EFF and Naphtylamine Blue Black B and 5 B are specially to be recommended, and for goods of superior fastness to perspiration, the before-mentioned Anthracene Acid Blacks (pages 78 and 79).

For the production of mode shades, as also for all other colours (blue, brown, red etc.), the one-bath method permits of quick and reliable working and considerable economy in time as compared with the older method of working. The dyeings obtained in this manner are distinguished by their good fastness to perspiration and rubbing, which is an important feature for goods used for linings.

In cases where the wool dyed in colours according to the one-bath method does not give satisfaction with regard to levelness it is dyed in an acid bath, the cotton being covered subsequently,

with Diamine Colours or with Basic Colours on a mordant of tannin and antimony or sumac and iron (see pages 157—158); very clear and light shades are, however, best dyed according to the one-bath method.

Fabrics composed of Wool and Mercerised Cotton

are best dyed in one bath with Diamine Colours of good fastness to light. Owing to the mercerised cotton displaying far more affinity to Diamine Colours than ordinary cotton, and owing further to the cotton portion of these goods being generally required to be lighter in tone than the wool (contrary to other union goods), the method of working is somewhat different from that for other union goods. The Diamine Colours of Group 3 which go easily on to the wool are principally used, or the dyestuffs of the first or second group together with suitable wool colours, the dyeing being carried out under continuous boiling.

In many cases also the absorption of the dyestuffs by the wool can be accelerated by the addition of small quantities of acetic acid, and in order to retain the lustre of the mercerised cotton it is advisable to work quickly and to add a little acetic acid to the rinsing bath.

In addition to the different *colours* for which the dyestuff combinations mentioned on pages 194 – 205 are recommended, *blacks* in particular are also dyed, for which

Union Fast Black J shaded with
Diamine Fast Blue FFG or FFB

is particularly well suited.

Union Crepons.

The production of crepon effects on union goods is based on the property of cotton to shrink when subjected to a treatment with strong caustic soda lye. The union goods, which are loosely woven with a view to obtaining the desired crimped styles, are treated for a short while with cooled caustic soda lye of about 32—42 deg. Tw., whereby the cotton shrinks and the desired crimped effect is produced.

The treatment with soda lye, the mercerising, is in the majority of cases carried out previously to the dyeing; it can however also be done after the dyeing, this way of working being resorted to for blacks and staple shades in particular, but it is imperative in such case that the mercerising, souring, rinsing, and neutralising with ammonia (if necessary) be carried out in quick succession.

While for the dyeing of previously mercerised goods any of the products suited for the dyeing of union goods (see pages 148—151) may be employed, the dyestuffs enumerated on the following page (page 180) are best suited for goods which are mercerised after the dyeing, as these best resist the subsequent mercerising process.

The goods are dyed according to the general recipe for dyeing union goods; the quantity of Glauber's salt may however be reduced for dark shades to about 1 lb per 10 gallons liquor in the case of previously mercerised goods. The boiling should be maintained rather longer owing to the cotton showing greater affinity for the dyestuff than the wool.

Two-coloured effects are sometimes required on crimped goods; the wool after mercerising is then dyed in an acid bath with easily levelling dyestuffs, and, after rinsing well (best in water containing a little ammonia or soda), the cotton is dyed in a cold to lukewarm bath with Diamine Colours and the addition of Glauber's salt and a little soda. The Diamine Colours best suited for this manner of working are enumerated on page 151. In order to enhance the brightness of shade of the dyeings, they are finally rinsed in water slightly acidulated with acetic acid, or if found desirable given a slight topping with Basic Colours.

Two-coloured effects can furthermore be obtained by first dyeing the wool in an acid bath, then mercerising, and finally dyeing the cotton. In addition to the neutral dyeing colours mentioned on page 180, the following wool dyestuffs may in this case also be used:

Naphtol Yellow S	Azo Wool Violet 7 R
Crystal Scarlet 6 R	Cyanole extra
Brilliant Cochineal 2 R	Indigo Blue N, SGN
Eosine GGF	Fast Acid Green BN
Lanafuchsine SG	Cyanole Fast Green G
Azo Rubine A	Naphtol Black 2 B
Brilliant Orseille C	Naphtylamine Black S.

Goods with a black cotton ground on the other hand are first cotton-dyed with Diamine Black BH at about 50° C. (120 deg. F.) with the addition of 2 lbs Glauber's salt and $^3/_4$—$1^1/_2$ oz soda per 10 gallons liquor, then rinsed, diazotised, and developed with Phenylene Diamine, and finally wool-dyed in an acid bath.

Dyestuffs which resist mercerising in producing crepon effects on Unions.

Diamine Colours *.

Thioflavine S
Diamine Gold
Diamine Yellow CP
Diamine Fast Yellow A, M, B, FF
Diamine Orange G, D, B
Diamine Rose BD, GD
Direct Rose T
Diamine Scarlet B, 3B
Diamine Brilliant Scarlet S
Diamine Fast Scarlet GG, 4BN, 6BS, 6BGN, 8BN
Diamine Red 4B, 5B, 10B
Oxy Diamine Red S
Diamine Purpurine B, 6B, 3B, V
Diamine Fast Red F
Diamine Bordeaux B
Diamine Violet N, BB, RB
Oxy Diamine Violet B, G, R
Diamine Heliotrope B, G
Oxy Diamine Blue G, 3G, 5G
Diamineral Blue R, CV
Diamine Brilliant Blue G
Diamine Fast Blue FFB, FFG, G
Diamine Sky Blue FF
Diaminogene B, extra
Diamine Dark Blue B
Diamine Steel Blue L
Diamine Green G, B, CL
Diamine Dark Green N
Oxy Diamine Brown G, 3GN, RN
Diamine Brown M, MR, B, 3G, R
Diamine Fast Brown G, R, GB
Diamine Catechine B, G
Diamine Black RO, BH, HW
Oxy Diamine Black BM, SOOO, A, SA, JE, JEI, JB, JW, JWF
Para Diamine Blacks, all brands
Union Black S, BG, BB, 3B

Neutral-dyeing Wool Dyestuffs *.

Indian Yellow G, R, FF
Tropaeoline OO
Orange extra, ENZ, EN, R
Croceine AZ
Roccelline, Azo Red A
Milling Red G, Wool Red B, BG
Rosazeïne B, 13, Irisamine G
Formyl Violet S4B, 6B, 8B, 10B, HW
Brilliant Milling Blue B
Brilliant Milling Green B
Lanacyl Blue BB, R
Lanacyl Violet B
Lanacyl Navy Blue B
Alphanol Blue BR extra
Naphtylamine Black 4B, 6B, X3B
Alphanol Black BG, R
Neutral Wool Black B, 4B.

* Dye in the usual manner with the addition of 2 lbs Glauber's salt per 10 gallons liquor, rinse, hydroextract well, and mercerise.

For mercerising, a box with guiding and squeezing rollers is used containing soda lye of 32—42 deg. Tw. which is cooled by means of a suitable cooling arrangement, or with ice, to about 5° C. (41 deg. F.). After passing the goods through the lye for 2 or 3 minutes, they are squeezed well and entered into a further receptacle containing a cold bath strongly acidulated with hydrochloric or sulphuric acid. They are hereafter rinsed thoroughly with a continual flow of water, and neutralised if necessary with ammonia.

Care should be taken that the acid bath always contains a sufficient amount of acid, and that it is still distinctly acid after the passage of the goods.

Union Astrachan

consists of a ground of cotton and woollen pile, which latter is curled by a special treatment.

These goods are dyed with Diamine Colours in combination with wool colours according to the one-bath process. A solid shade on the two fibres is not required, it being sufficient to dye the cotton slightly deeper than the wool. Since the wool usually absorbs the dyestuff very easily, the dyeing should be carried out slowly and at not too high a temperature.

The best way of working is to commence at about 50° C. (120 deg. F) and to gradually raise the temperature until the wool is dyed to the right depth, which is usually the case below boiling temperature.

It is advisable after rinsing to treat in water slightly acidulated with acetic acid, and to top with Basic Colours in accordance with the directions given on page 153 where necessary in order to obtain bright results.

The lustre of the goods may be enhanced by applying a thin solution of British gum and glycerine on a finishing machine, drying and steaming subsequently for about $^1/_2$ hour at 1 atm. The British gum is then removed by rinsing with water, hydroextracting, and drying.

Mohair Plush.

The goods prepared by raising, steaming and cropping are degreased by a thorough washing in the washing machine without squeezing rollers or with only light ones in a soda and soap bath of a temperature of 30—40° C. (85—105 deg. F.) for $^1/_2$—$^3/_4$ hour, and are then rinsed well in clear water.

For the dyeing a distinction is made between the following qualities:

a) Goods with a white ground,

b) Goods with a cotton or a cotton and linen ground dyed fast to acids.

a) Goods with a white ground:

Pale shades are mostly dyed by the one-bath method as is customary for union goods, but in order to keep

the pile in as good condition as possible, only very little Glauber's salt is added to the dye-bath, the dyeing being carried out within as short a time as possible and without boiling (at about 70° C. or 160 deg. F.). The dyed goods are to advantage soured off in water slightly acidulated with acetic acid.

In order to dye the wool a sufficiently deep shade at a temperature below the boil, the Diamine Colours of Group 3, or of Groups 1 and 2 in combination with wool colours, should mainly be employed, a slight addition of acetic acid (0,5—1%) assisting the absorption of Diamine Colours by the wool.

Medium and dark shades are dyed by the two-bath method; the goods are first dyed in the usual manner in an acid bath, and the ground of cotton, or of cotton and linen, is then covered in a cold to lukewarm bath with Diamine Colours (see page 157), or with Basic Dyestuffs on a mordant of tannin and antimony or sumac and iron (see page 158).

Since by cotton-dyeing with Diamine Colours better fastness to rubbing is obtained than when applying Basic Dyestuffs, the former will be used to advantage, particularly for plush used for upholstery, etc., and only in the case of very bright shades, and for dark and full dyeings on plush with special designs which cannot be obtained in the required depth and brightness with Diamine Colours, will Basic Colours be found indispensable.

b) Goods containing cotton dyed fast to acids.

This class of goods is dyed in a much simpler way than that described under (a), since it is only necessary in this case to dye the mohair pile, which is, almost without exception, done with Acid Colours. According to the quality of the goods to be dyed, the following products of good fastness to light may be employed:

For grey and mode shades:

Combinations of

Acid Yellow AT
Orange GG, II, extra
Lanafuchsine SG, SB
Azo Orseille BB
Cyanole Green B, 6G
Cyanole Fast Green G.

For Brown:

Combinations of

Acid Yellow AT
Tropaeoline OO, O
Orange IV, II, extra, GG
Lanafuchsine SG
Azo Wool Violet 7R
Cyanole Green B, 6G
Cyanole Fast Green G
Tetra Cyanole V.

For Red and Claret:

Scarlet FR, F2R, F3R
Azo Rubine A
Brilliant Cochineal 2R, 4R
Croceïne AZ
Brilliant Croceïne, all brands
Lanafuchsine SG, SB, 6B
Naphtol Red C
Azo Wool Violet 7R

shaded according to requirement with yellow, orange, green, or blue, same as for brown.

For Red on upholstery plush (especially for railway carriages), Diamine Fast Red is frequently used and appreciated for its very good fastness to light, perspiration and rubbing. Charge the bath at 40—50° C. (105—120 deg. F.), according to the depth of shade to be obtained, with 1—2½% Diamine Fast Red F, 10% Glauber's salt and 2—5% acetic acid, enter the goods, and raise gradually to the boil, after ½ hour's boiling adding another 2—3% acetic acid if necessary in order to exhaust the liquor. After another ½ hour's boiling, add 3% chromium fluoride, run for another ½—¾ hour, and finally rinse well.

For Green and Olive:

Combinations of

Acid Yellow AT
Indian Yellow FF
Orange G, II, extra, R
Lanafuchsine SG
Cyanole Green B, 6G
Cyanole Fast Green G
Naphtol Dark Green G for dark green.

For blue and purple:

Tetra Cyanole V
Cyanole extra, FF
Brilliant Naphtol Blue B, R, 4B
*Lanacyl Blue BB, R
*Lanacyl Navy Blue B, BB
Azo Wool Blue SE, SER
*Alphanol Blue BR extra
Peri Wool Blue B, BG, G
*Lanacyl Violet B
Azo Wool Violet 4B, 7R
Formyl Violet, for brightening.

For Black:

Naphtylamine Black ESN, ES3B, ES5B, SS2B, SS3B
Naphtylamine Blue Black B, 5B.

The dyestuffs marked with an asterisk (*) are dyed with the addition of Glauber's salt and acetic acid, and exhausted with bisulphate of soda; the other dyestuffs may be dyed straight-away with the addition of bisulphate of soda.

After dyeing (best at full width), the goods are cooled at once in a rinsing vat filled with cold water, and finally rinsed once more very thoroughly in the washing machine. If the fastness to rubbing then still leaves anything to be desired, the plush is treated in the following manner:

Charge a cold bath in the washing machine with a sufficient amount of glue solution to give it a slightly sticky feeling, then add a little silicate of soda in solution gradually until a slightly alkaline reaction sets in, run the goods for about 20 minutes, then rinse well with fresh water, hydroextract, and dry.

The lustre of the plush may be enhanced by brushing on, either by hand or by means of a suitable machine, a solution of

40 lbs	British gum	per 10 gallons water.
10 „	wheat flour	
$1\frac{1}{2}$—2 pints	glycerine	
$\frac{3}{8}$—$\frac{1}{2}$ „	acetic acid.	

The plush is then dried, steamed for about 1 hour, washed well in the washing machine, hydroextracted, and dried.

Union Hosiery.

In the dyeing of union hosiery it is more important than with most other union fabrics to pay attention to uniform shades being obtained on the wool and cotton, differences in shade between the two fibres being particularly prominent on such goods.

In order to prevent the cotton from showing up, it is advisable to dye it somewhat deeper than the wool and preferably to employ the dyestuffs of Group 2, especially for mode shades.

For the production of blacks,

Diaminogene B or
Oxy Diaminogene OT

with the addition of a little

Formyl Violet 10 B for more bluish blacks, and
Naphtylamine Black 4 B, 6 B for deeper shades of black,

in a bath slightly acidulated with acetic acid, are greatly in favour in practice. Dye with 2 lbs Glauber's salt crystals per 10 gallons liquor and 1—2 % acetic acid of 8 deg. Tw. near boiling temperature; rinse, diazotise, and develop with Beta Naphtol and Phenylene Diamine. (See pages 156 and 157.)

As a direct dyeing black of good fastness to washing and light,

Union Fast Black J

may be recommended, and cheap blacks much in use are the various brands of *Union Black, viz. P, BG, BB, 3 B, 1993 J.*, etc., as also the *Oxy Diamine Black* brands *JB, JW, JWF* in particular. The fastness to washing of these direct dyeing blacks is improved by an after-treatment with formaldehyde or formaldehyde and bichromate of potash. (Page 155.)

For navy blue shades, combinations of the following dyestuffs are specially well suited:

Diamine Black BH
Oxy Diamine Blue G, 3 G
Diamine Heliotrope B
Lanacyl Navy Blue B and BB
Alphanol Blue BR extra
Formyl Violet, all brands.

For tan shades on stockings which are greatly in favour,

Union Brown 1926 J, 2089 J, Diamine Brown No. 33

may be used.

All other shades are produced with the dyestuffs enumerated on pages 194—205.

Union Felt.

Union felts are almost invariably dyed by the one-bath method.

In consideration of the very low quality of the goods, cheap products are employed as a rule, expecially for deep shades, and prolonged boiling or dyeing for any length of time should be avoided as much as possible in view of the lack of resistance of these, usually, thin felts. If the wool has not attained the required depth of shade after boiling for some time, wool colours are added in order to avoid prolonged boiling.

The Diamine Colours suited for this purpose are principally those of Group 1, as also combinations of the dyestuffs enumerated in the tables on pages 194—205.

For scarlet shades greatly in demand for felts,

Diamine Scarlet B
shaded with
Rosazeïne B
or
Diamine Orange G
Diamine Fast Scarlet GG, 4BN
Diamine Red 4B

are used; for producing tan shades, the following are well adapted:

Union Brown 1926J, 2089J
as well as combinations of
Diamine Orange B
Diamine Catechine 3G
Diamine Brown 3G
Diamine Fast Yellow M
Diaminogene B
Union Black S
Lanacyl Blue BB, R
Naphtol Blue Black.

In cases where the shades obtained by the one-bath method are not sufficiently bright, they are topped in a fresh cold to lukewarm bath with Basic Colours, with the addition of acetic acid. (See page 153.)

Bright green and violet are obtained, for instance, by first dyeing hot with Diamine Colours and wool dyestuffs, and topping subsequently with Basic Colours, cold to hot, in a bath slightly acidulated with acetic acid.

Green:

Oxy Diamine Yellow GG, TZ, or
Thioflavine S
in combination with
Naphtaline Yellow
Brilliant Milling Green B
and topped with
Brilliant Green.

Violet:

Oxy Diamine Violet B, R or
Diamine Violet N
in combination with
Oxy Diamine Blue G
Formyl Violet S4B
Croceïne AZ
and topped with
Methyl Violet 6B—4R.

Union Braids and Brush Braids.

Woven tapes or braids are singed, steamed on the steaming cylinder, and finally scalded in boiling hot water. After cooling, the goods are rolled up in hank form, washed with soda or ammonia and soap, rinsed, and dyed.

These goods are dyed like other union fabrics according to the one-bath method in a neutral Glauber's salt bath with the dyestuff combinations given in the tables on pages 194—205, following the manner of working described on page 152.

Solid shades on the wool and cotton are particularly required for union brush braids, and for this class of goods, dyestuffs of Group 1 (page 148) are therefore principally selected which dye wool and cotton as evenly as possible. For the sake of the appearance of the goods it is well to dye the cotton a little deeper than the wool, the same tone however being maintained.

Pale bright shades are best dyed without boiling, at a temperature of 70—80° C. (160—175 deg. F.); very bright and pure tones are obtained by stoving after the dyeing. (For recipe see pages 170—171).

In some cases, particularly for the production of bright and full tones, braids may also be dyed by first wool-dyeing in an acid bath, and cotton-dyeing subsequently with Basic Colours on a mordant of tannin and antimony (see page 158.)

Union Yarn.

Union yarns, like braids, are dyed with Diamine Colours in combination with wool dyestuffs. Where the fastness to washing of direct dyeings does not give complete satisfaction, they may be rendered faster by a suitable aftertreatment as described on page 153, or, again, they may be dyed by the two-bath method with wool colours fast to milling and Immedial Colours. (For dyeing instructions see page 162, as also tables on pages 194—205).

Cheap blacks of good fastness to milling are dyed with

Oxy Diamine Black JB, JW, JWF, or with
Oxy Diamine Black US, UI
Para Diamine Black B, BB, FFB
in combination with
Alphanol Black BG, R,

aftertreating with 3% formaldehyde and 1% bichromate of potash; and of good fastness to light and milling with

Diamine Jet Black SS, OO
in combination with
Alphanol Black BG, R
Anthracite Black B, R,

aftertreating with 3% bichromate of potash and 2% acetic acid.

Blacks with best possible fastness to light and milling are to advantage produced with Chrome Colours in combination with Immedial Colours (see page 162).

Cheap shades of black fast to milling and acids are obtained with

Oxy Diamine Black JW
coupled with Nitrazol C.

Shoddy Cloths with Cotton Warp.

Union shoddy piece-goods are generally manufactured from carbonised or non-carbonised shoddy weft and a cotton warp, being then dyed either according to the one-bath or the two-bath method, whichever yields the desired shade the most easily on a ground which in the case of such goods is usually dark.

When working in two baths, the wool can either be dyed first, the cotton being dyed subsequently with Diamine Black RMW, or the goods are cotton-dyed first with a black fast to acids (either in the dye-vat or in the milling machine) and wool-dyed subsequently.

In order to produce as light shades as possible on a dark ground, the coloured material is frequently stripped, for which purpose bichromate of potash and sulphuric acid, or Hyraldite, are generally employed.

The various methods of stripping are described on pages 163—165.

1. One-bath Method for Shoddy Cloth.

When working according to the one-bath method, it must be remembered that shoddy absorbs the dyestuffs more readily than other qualities of wool, and that the wool, which in itself is usually dyed a dark shade already, requires less dyestuff than the cotton contained in the cloth which is generally undyed. In order to cover the cotton sufficiently well, it is advisable to use those Diamine Colours which dye the cotton more strongly than the wool (Group 2, page 148) and to commence dyeing below boiling temperature, only raising to the boil in case the wool has not been dyed a sufficient depth at a lower temperature.

A material which has been previously stripped in an acid bath should be neutralised well with soda and rinsed before being entered into the dyebath. If vats are used for the dyeing which have previously been employed for acid dyeing or stripping, they must be boiled out beforehand with soda.

With a view to obtaining bright and even shades on shoddy goods by the one-bath method, the dyeing is frequently carried out by first boiling for $^1/_2$ hour to $^3/_4$ hour with neutral-dyeing wool colours and Glauber's salt, then adding the cotton colours and running for $^3/_4$—1 hour in the cooling bath. This method of working is of particular advantage for blue, as the black dyestuff used for covering the cotton is thus

prevented from going on to the wool, so that brighter results are obtained in this manner than according to the ordinary method of working. The brightest shades are obtained by using such dyestuffs for the cotton as have only little tendency to go on to the wool, such as Union Black 2340J and Oxy Diamine Black KW.

2. Two-bath Method for Shoddy Cloth.

a) Acid-dyeing the wool previously and cotton-dyeing subsequently. This method of working is applied a great deal, particularly for very dark shoddy goods; brighter results are obtained in this manner than when dyeing in one bath, coloured wool being stripped to some extent by the acid dyeing and greater uniformity and brightness of shade being obtained thereby.

Dye with Acid Colours as usual (pages 68—79), and on exhaustion of the bath add another 6—8 % sulphuric acid, boiling hereafter for further $^1/_2$—$^3/_4$ hour.

After the acid-dyeing, rinse, and then cotton-dye in a cold to lukewarm bath, best in the washing machine, as described on page 157.

When stripping shoddy goods before the dyeing by boiling with bichrome and sulphuric acid, certain dyestuffs may be applied by being added straight to such stripping bath.

The following may be applied to advantage in this manner

Naphtol Yellow S	Formyl Violet 10 B, S4 B
Fast Yellow S	Alkaline Violet C, CA
Acid Yellow AT	Acid Green extra conc.
Indian Yellow G, R, FF	Acid Green extra conc. B
Orange extra, II, EN, ENZ	Fast Acid Green BN
Scarlet FR, F2R, F3R	Brilliant Milling Green B
Brilliant Cochineal 2R, 4R	Cyanole Fast Green G
Brilliant Orseille C	Cyanole FF, extra, GG
Azo Orseille BB	Tetra Cyanole V, SF, extra, A
Acid Magenta	Formyl Blue B
Acid Violet 4RS, 6BS	Brilliant Milling Blue B.

b) Cotton-dyeing previously, with subsequent wool-dyeing. The cotton is first dyed black or brown with Diamine or Immedial Colours, and after the necessary rinsing the required shades are produced on the wool in an acid bath.

With *Diamine Colours*, black shades for instance are produced by dyeing either *in the vat* for 1 hour at 50—60° C. (120—140 deg. F.) with

5—6 % Para Diamine Black B, BB, or
Oxy Diamine Black SA, UI, US, or with
3—3,5 % of the concentrated brands of these products or of Diamine Milling Black B conc, FG extra, FFB extra conc.

for the starting bath, with the addition of 2 lbs Glauber's salt crystals and 1½ oz soda per 10 gallons liquor (page 159), or *in the milling machine* (page 159) with, say,

1—1,5% Diamine Milling Black B conc., FG extra, FFB extra conc.

If a brown warp is required in the place of the black one, the goods are dyed with Diamine Nitrazol Brown G or B either in the vat or in the milling machine, and after rinsing are straightaway coupled in the washing machine with Nitrazol C (p. 155); the Immedial Brown brands enumerated on page 197 may likewise be used for the purpose.

The cotton-dyeing previously with *Immedial Colours* is carried out in the *jigger* as described on page 162; any of the Immedial brands mentioned on page 205 may be used for this purpose.

For the *subsequent wool-dyeing*, any Acid Colours which are suited for piece-dyeing may be applied, as, for instance,

for black:

Naphtylamine Black 4B, 6B, S, 4BS, ES3B, ESN etc.

Naphtylamine Blue Black B, 5B, Naphtol Black B, 3B, 6B;

for deep blue:

Azo Wool Blue SE, SER, Formyl Violet, all brands
Azo Navy Blue B, 3B Acid Violet 6BS;
Acid Navy Blue A

for brown, green, and olive:

Combinations of

Cyanole Green B, 6G Acid Yellow AT
Lanafuchsine SB, SG Indian Yellow G
Naphtol Red EB, C Tropaeoline OO.
Orange extra, II.

First charge the bath with the dyestuff and the whole quantity of bisulphate of soda or acid required for exhaustion; enter the goods warm, raise slowly to the boil, and boil gently until the liquor is exhausted. The dyebath must be distinctly acid from the beginning, since the cotton dyestuff is apt to boil off again if the bath is neutral.

Uncarbonised Shoddy, Wool Waste, Rags, etc.

In the dyeing of shoddy, a distinction is drawn between material free from cotton, i. e. carbonised material, and such containing vegetable matter, particularly cotton.

In order to save the expense of carbonising and to obviate the loss of weight incurred thereby, the vegetable matter contained in the latter material is dyed the same shade and depth as the wool.

Rags and similar waste still in the untorn state are before dyeing sorted according to quality and colour to enable choice being made of whichever ground colour appears best suited for the shade to be dyed. By this means, a previous stripping of the material is in many cases saved which would otherwise be indispensable in order to obtain the desired shade. In such cases, however, where the ground shade is dark and it is found necessary to produce light shades thereon, the dark ground is removed as much as possible before dyeing by means of suitable stripping agents; those used most frequently are described on page 163. In the case of goods to be dyed according to the one-bath method, the material which has previously been stripped in an acid bath must be neutralised with soda and rinsed before being entered into the dyebath.

Shoddy generally absorbs dyestuff more readily than other kinds of wool, and the coloured wool portion requires less dyestuff than the cotton with which it is woven up, which latter is mostly white; it is therefore advisable to employ principally the Diamine Colours of Group 2, and to commence dyeing a little below boiling temperature, raising the temperature to the boil if the wool has not been dyed a sufficient depth at a lower temperature.

The dyeing is carried out with Diamine Colours in combination with wool dyestuffs in a short bath, with the addition of 10 % Glauber's salt crystals for light, and 20—30 % for medium and dark shades, according to the one-bath method (see page 152). Aftertreatments applied with a view to fixing the shades fast to milling are described on page 153. The wool may also be dyed first with wool dyestuffs fast to milling, the cotton being subsequently covered with Immedial Colours (see page 162).

For black, the following are particularly well suited:

Oxy Diamine Black JB, JW, JWF
Union Black OJGJ
Para Diamine Black B, BB, FFB, OAKH
Oxy Diamine Black US, SA

dyed direct, or, if better fastness to milling be required, aftertreated with 3% formaldehyde and 1% bichrome for 1/2 hour at 70—80° C. (160—175 deg. F.)

Deep blue is dyed with

Para Diamine Black B, BB, FFB, or
Oxy Diamine Black SA
in combination with
Formyl Violet, all brands
Brilliant Milling Green B
Formyl Blue B

aftertreated if necessary (like black) with formaldehyde and bichrome.

For dyeing blacks on shoddy which contains silk, in addition to cotton, *Oxy Diamine Black JW, JWF*, are best suited. Dye as in the case of unions with the addition of 20% Glauber's salt crystals; enter into the bath which has been previously brought to the boil, treat without steam for 1/2 hour, then boil gently for 1/2 hour, finally leaving the goods to feed for 1/2 hour in the cooling bath. The fastness to milling of the dyeing, in itself good, may be still further enhanced by an aftertreatment with formaldehyde and bichrome, or by coupling with Nitrazol.

It is well to add a little soda (0,2—0,3% to the dyebath when dyeing goods which have not been previously scoured and may contain slight quantities of oil or grease.

a) Simplest and cheapest method of production

One-bath combinations of

Oxy Diamine Black FFC, JE, JB, JW, JWF
Union Blue Black 2340J
Diamine Black BH, BHN
Direct Grey 2207J
Diamine Catechine B, 3G
Diamine Orange B
Diamine Fast Yellow B
Diamine Bordeaux VRO, B

shadded with

Lanacyl Blue BB, R
Lanacyl Violet B
Naphtol Blue Black
Azo Red A
Naphtol Blue G, R

Dye with ½—1 lb Glauber's salt crystals per 10 gallons liquor, directions page 152.

For two-bath dyeings combinations of

Naphtol Yellow S
Indian Yellow FF
Orange extra, II
Azo Orseille BB
Lanafuchsine SB
Indigo Blue N

dyed boiling in an acid bath, rinsed, and cotton-dyed in a cold liquor with

Diamine Fast Yellow A, B
Diamine Orange G, D
Diamine Black BH
Diamine Nitrazol Brown G
Diamine Brown S

and ½—1 lb Glauber's salt crystals and ⅜ oz soda per 10 gallons.

Directions page 157.

b) Of better fastness to light

One-bath combinations of

Diamine Fast Black F
Diamine Jet Black SS
Diamine Dark Blue B
Diaminogene B, extra
Diamine Fast Blue FFB, G
Diamine Catechine B, 3G
Diamine Fast Brown G, R, GB
Diamine Orange B, D, G
Diamine Fast Yellow B, FF, M
Diamine Bordeaux B

shaded with the wool dyestuffs mentioned under (a).

Dye with ½—1 lb Glauber's salt crystals per 10 gallons liquor; directions page 152.

Two-bath dyeings are produced with combinations of

Acid Yellow AT
Orange II, extra
Azo Orseille BB
Lanafuchsine SB, SG
Cyanole Green B, 6G
Cyanole Fast Green G

and after well rinsing the acid-dyed goods, cotton-dyed with

Diamine Fast Yellow A, B
Diamine Orange G, D
Diamine Brown S
Diamine Black HW
Diamine Fast Blue FFB

and ½ lb Glauber's salt crystals and ⅜ oz soda per 10 gallons liquor. Directions page 157.

c) Of good fastness to milling for yarn and shoddy

For pale shades, the combinations under (a) and (b) for one-bath dyeing are usually sufficient in point of fastness to milling; for medium and deep shades,

One-bath combinations

of the following dyestuffs are used, being aftertreated with metallic salts:

Diamine Fast Yellow B, FF
Diamine Orange B
Diamine Catechine B, 3 G
Diamine Brown M, 3 G
Oxy Diamine Brown RN
Diamineral Blue R
Diamine Dark Blue B
Diamine Jet Black SS, OO, Cr, RB
Union Black S

aftertreated with

bichrome and acetic acid;

or, (with the exception of Diamine Jet Black and Union Black S) with

bichrome sulphate of copper and acetic acid.

For shading the wool, the following are used:

Anthracene Yellow C
Milling Red G
Wool Red B, BG
Formyl Blue B
Brilliant Milling Blue B
Brilliant Milling Green B.

Dye with $^1/_2$—1 lbs Glauber's salt crystals per 10 gallons liquor for yarn, 5—10 % Glauber's salt crystals for shoddy.

Dyeing instructions pages 152 and 154.

d) For dyeings fast to milling on yarn and shoddy, using Immedial and Chrome Colours

Combinations of

Anthracene Chrome Blue G, BB, F, FD
Anthracene Chrome Red A
Anthracene Chrome Brown D, DW, SWN
Anthracene Acid Brown G
Anthracene Yellow BN.

Dye according to Methods VIII-XI, pages 9—12. After rinsing, dye the cotton with

Immedial Yellow Olive G
Immedial Yellow Brown EN
Immedial Cutch O, G, R, BG, BGG
Immedial Olive B, 3 G
Immedial Brown B, G, RR, BR, W conc.
Immedial Dark Brown A
Immedial Dark Brown D conc.
Immedial Direct Blue B, R, OD
Immedial Black NN conc, NLN conc., NBB conc., NB, NF etc.

Dye at 35° C. (95 deg. F.) with the same weight of sodium sulphide and double the weight of glucose as of dyestuff, together with 3 oz soda and $^1/_2$—1 lb Glauber's salt crystals per 10 gallons liquor.

Directions page 162.

a) Simplest and cheapest method of production

One-bath dyeings:

Union Dark Brown A
Union Brown TD, 1926J, 2089J

or combinations of

Diamine Red 4 B, 5 B, 10 B
Diamine Brown M, MR, R, 3 G
BWA, GWA, 30a, 40, 42a, 43
Oxy Diamine Brown G, 3GN, RN
Diamine Catechine G, 3 G
Oxy Diamine Black A, JB, JW, JWF
Para Diamine Black B, BB, FFB, FF extra conc.

shaded with

Naphtylamine Black 4 B, 6 B
Naphtol Blue Black
Indian Yellow G, R, FF
Orange II, IV, extra
Tropaeoline OO.

Dye with 2 lbs Glauber's salt per 10 gallons liquor; directions page 152.

Shoddy materials are frequently wool-dyed first in an acid bath with combinations of

Cyanole Green B, 6 G
Cyanole Fast Green G
Acid Yellow AT
Indian Yellow G
Lanafuchsine SG, SB
Naphtol Red C, EB,

then rinsed and cotton-dyed in a fresh cold to lukewarm bath for $^{1}/_{4}$—1 hour with $2^{1}/_{2}$–4 oz

Diamine Black RMW,

and 2 lbs Glauber's salt and $^{3}/_{4}$ oz soda per 10 gallons liquor.

Directions page 157.

b) Of better fastness to light

One-bath combinations of

Diamine Brown M, B
Diamineral Brown G
Diamine Fast Brown G, R, GB
Diamine Fast Red F
Union Black S
Diamine Dark Blue B
Diamine Fast Black F, X
Diamine Jet Black SS, Cr, RB, OO
Diamine Fast Yellow B, FF, M
Diamine Yellow CP

shaded with

Naphtylamine Black 4 B, 6 B
Naphtol Blue Black
Indian Yellow G, R, FF
Orange II, IV, extra
Tropaeoline OO.

Dye with 2 lbs Glauber's salt per 10 gallons liquor; directions page 152.

Dyeing according to the two-bath method is carried out as under (a) with the dyestuffs there mentioned, which possess good fastness to light.

c) Of good fastness to milling for yarn and shoddy

One-bath combinations of

- Diamine Brown M, B, 3G
- Oxy Diamine Brown G, RN

after-treated with bichrome and acetic acid

- Diamineral Brown G
- Diamine Catechine G, 3G
- Diamine Dark Blue B

or bichrome, sulphate of copper, and acetic acid.

- Diamine Fast Red F
- Diamine Jet Black SS, OO, Cr
- Union Black S
- Oxy Diamine Black UI

after-treated with bichrome and acetic acid.

- Diamine Brown S, MR, ATC
- Diamine Catechine G
- Diamine Fast Brown R
- Oxy Diamine Black SA, JB, JW, JWF
- Para Diamine Black B, BB, FFB

after-treated with formaldehyde and bichrome

For shading the cotton, use the following:

Diamine Fast Yellow B, FF, A
Diamine Bordeaux B,

and for shading the wool:

Anthracene Yellow C
Brilliant Milling Green B
Brilliant Milling Blue B
Formyl Blue B
Formyl Violet 10B, S4B, S5B.

Dye yarn with 2 lbs salt per 10 gallons or shoddy with 20% Glauber's salt crystals, aftertreating with 3% bichrome and acetic acid or 2% bichrome, 2% sulphate of copper and 3% acetic acid, or 3% formaldehyde and 1% bichrome at 70–80° C. (160–175 deg. F.) for ½ hour. Directions pages 152 and 154.

d) For dyeings fast to milling on yarn and shoddy, using Immedial and Chrome Colours

Combinations of

Anthracene Chromate Brown EB, 3G

or

Anthracene Chrome Red A
Anthracene Chrome Brown D, DW, A, SWN
Anthracene Acid Brown B, G, N, R, V
Anthracene Chrome Blue G, B, BB, R
Anthracene Acid Black SR, ST, DSN.

Dye the respective dyestuffs according to the directions on pages 9–12, Methods VIII—XI, rinse well, and, in order to dye the cotton, enter the material into a lukewarm bath charged according to the shade desired with

Immedial Brown B, G, RR, BR, W conc.
Immedial Dark Brown A
Immedial Dark Brown D conc.
Immedial Cutch O, G, R, BG, BGG
Immedial Maroon B conc.
Immedial Bordeaux G conc.
Immedial Black NN conc.

Dye with an equal quantity of sodium sulphide crystals and double the quantity of glucose as of dyestuff, 3 oz soda and (according to the depth of shade) with ½—3 lbs Glauber's salt crystals per 10 gallons; enter the material at 35° C. (95 deg. F.), and leave for 2–3 hours or overnight immersed in the liquor.

Directions page 162.

Dyestuffs for Pink, Red and Claret on Unions and Shoddy.

a) Simplest and cheapest method of production

Pink.

Diamine Rose BD, GD, BG
Direct Rose T
Oxy Diamine Red S
shaded with
Erythrosine B, D, extra N
Rosazeïne B
Irisamine G

Yellowing agents:

Diamine Orange F;
for yellowish shades
Diamine Scarlet B
may likewise be used.

Red.

Diamine Red 4B, 5B, 6B, 10B, 101 J
Diamine Purpurine B, 3B, 6B, V
Diamine Scarlet B, 3B
Diamine Fast Scarlet GG, 4BN, 6BS, 6BGN, 8BN
Cotton Red A.

For very bright shades of scarlet,
Diamine Scarlet B
shaded with
Rosazeïne B or
Diamine Orange D is used.

Claret.

Diamine Bordeaux B, S, VRO
Oxy Diamine Violet G, R
shaded with
Wool Red B, BG
Croceïne AZ
Formyl Violet S4B, S5B, HW.

Dye according to the depth of shade with $^1/_2$—2 lbs Glauber's salt crystals per 10 gallons liquor. Directions page 152.

b) Of good fastness to milling for Yarn and Shoddy.

Pink.

Direct Rose T
Rosazeïne B

Red.

Diamine Fast Red F, aftertreated with chromium fluoride;
Primuline / shaded with / Wool Red B / *Diamine Azo Scarlet A, B — diazotised and developed with Beta Naphtol

Claret.

Diamine Azo Bordeaux B / shaded with / Wool Red B / Formyl Violet S4B — or — Primuline / shaded with / Diamine Azo Blue RR / Formyl Violet S4B — diazotised and developed with Beta Naphtol

Dye with $^1/_2$—2 lbs Glauber's salt per 10 gallons liquor for yarn, with 10—20% Glauber's salt for shoddy.

Diazotising and developing is carried out according to the directions on page 156.

* Diamine Azo Scarlet, if used for dyeing wool and cotton uniformly, is dyed at 70—80° C. (160—175 deg. F.). Diamine Azo Bordeaux and Primuline may likewise be applied at this temperature for cotton dyeing after the developing; the wool is in this case shaded in an acid bath.

Dyestuffs for Bright Blue, Purple, Green, Yellow and Orange on Unions and Shoddy.

Blue and Purple

(Deep Blue see next page)

One-bath dyeings:

Union Blue BJ, RJ
or combinations of
Diamine Sky Blue, FF, FFS
Diamine Pure Blue A
Oxy Diamine Blue 5G, 3G, G, B, R
Diamine Blue BB, 3B
Diamine Brilliant Blue G
Diamineral Blue CV
Diamine Violet N, BB, RB, 2004J, 2005J
Diamine Heliotrope B, O, G
shaded with
Brilliant Milling Blue B
Formyl Blue B
Alkaline Blue 6B—3R
Brilling Milling Green B
Formyl Violet 10B, 8B, 6B, S4B, S5B, HW
Alkaline Violet C, CA.

Dye as on page 152, brightening the cotton if necessary in a fresh cold bath with the addition of 2—3% acetic acid with

Methylene Blue BB
New Methylene Blue N
Victoria Blue B
Methyl Violet 6B—4R
Crystal Violet 5B bluish, 10B.

Bright blues and purples may also be obtained by dyeing the wool in an acid bath with wool dyestuffs and then cotton-dyeing with

Diamine Sky Blue, FF, FFS
Diamine Pure Blue A
Diamine Blue BB, 3B
Diamine Heliotrope G, O, B

in a cold bath, directions page 157; or, cotton-dyeing with the above Basic Colours after suitable mordanting with tannin and antimony; directions page 158

Green, Yellow and Orange

(Dark Green and Olive, page 202)

Green.

One bath combinations of

Diamine Sky Blue, FF, FFS
Diamine Pure Blue A
Oxy Diamine Blue 5G
Oxy Diamine Yellow GG, TZ
Thioflavine S
Diamine Fast Yellow M, 3G
shaded with
Brilliant Milling Green B
Naphtaline Yellow crystals.

Dye with 1/8—2 lbs Glauber's salt crystals per 10 gallons liquor, topping if necessary with

Brilliant Green crystals extra
Solid Green crystals O
Malachite Green conc.

with the addition of 2–3% acetic acid.
Directions pages 152 and 153.

Yellow and Orange.

One-bath combinations of

Thioflavine S
Oxy Diamine Yellow GG, TZ
Diamine Fast Yellow A, AGG, AR, B, FF, 3G, M
Diamine Orange B, G, D, F
Oxy Diamine Orange G, R
shaded with
Naphtaline Yellow crystals
Indian Yellow FF, G, R
Tropaeoline G, OO
Orange extra, R, ENZ.

Directions page 152.

a) Simplest and cheapest method of production

One-bath dyeings:

Union Blue 806, OHDF
Union Navy Blue 780J
or combinations of
Oxy Diamine Blue G, 3G
Diamine Bengal Blue G, R
Diamineral Blue R, CV
Diamine Black BH, BHN, BHR
Union Blue Black 2340J
Oxy Diamine Black A, SA, JW, KW, JWF
Para Diamine Black B, BB, FFB
shaded with
Formyl Violet 10B, 8B, 6B, S4B, S5B, HW
Alkaline Violet CA, C
Formyl Blue B
Brilliant Milling Green B

Dye according to directions on page 152.

In order to produce as bright shades as possible, *dark shoddy materials* are dyed by the two-bath method.

After first dyeing the cotton, either in the milling or in a bath of 50—60° C. (120—140 deg. F.) with

Diamine Milling Black B conc., FG extra, FFB extra conc.
Para Diamine Black B, BB, FFB
Oxy Diamine Black UI, US, SA,

dye the wool in an acid bath with

Acid Violet 6BS
Formyl Violet, all brands
Brilliant Milling Blue B
Brilliant Wool Blue RB, BG;

or, the wool is dyed first and the cotton subsequently in the washing machine or in the vat with

Diamine Black BH and RMW

according to the directions pages 157-161. By the latter method the brightest shades are obtained.

b) Of better fastness to light

One-bath combinations of

Diamine Fast Blue FFB, G
Diamine Dark Blue B
Union Black S
Diamine Jet Black SS
shaded with
Lanacyl Blue BB, R
Lanacyl Violet B
Lanacyl Navy Blue B
Alphanol Blue BR extra
Formyl Violet 10B, 8B, 6B, S4B,
Formyl Blue B [S5B, HW
Brilliant Milling Blue B
Naphtol Blue Black
Naphtol Blue Black 6B

For shading the cotton towards red, the following are used:

Diamine Heliotrope B
Oxy Diamine Violet B
Diamine Bordeaux B.

Directions for dyeing page 152

Piece-goods, with a view to obtaining good fastness to perspiration and wearing, are frequently dyed by the two-bath method with

Diamine Black BH and BHR,

dyeing the cotton in a bath of 50—60° C. (120—140 deg. F.), developing with Beta Naphtol (page 160) and cross dyeing in an acid bath with

Azo Wool Blue SE, SER
Azo Navy Blue B, 3B
Acid Navy Blue A
Brilliant Naphtol Blue B, R, 4B
Lanacyl Blue BB, R
Lanacyl Navy Blue B, BB
Alphanol Blue BR extra.

If the reverse method of wool-dyeing first, then covering the cotton, and finally diazotising and developing be applied,

Azo Wool Blue SE, SER
Azo Navy Blue B, 3B

may be used.

c) Of good fastness to milling for yarn and shoddy

One-bath dyeings of

Diamineral Blue R, CV / Diamine Dark Blue B — aftertreated with bichrome and acetic acid or bichrome, sulphate of copper and acetic acid

Diamine Jet Black SS, OO, CR, RB, aftertreated with bichrome and acetic acid

in combination with

Formyl Violet 10B, 8B, 6B, S4B, S5B
Alkaline Violet C, CA
Formyl Blue B
Brilliant Milling Blue B
Brilliant Milling Green B.

For very deep blues, the following are also well adapted:

Para Diamine Black B, FFB / or / Oxy Diamine Black SA, A, JW, JWF — in combination with Formyl Violet — aftertreated with 3% formaldehyde and 1% bichrome.

Dye yarn with 2 lbs Glauber's salt per 10 gallons liquor, shoddy with 20% Glauber's salt crystals, from boiling hot to boiling.

Directions page 152.

d) For dyeings fast to milling on yarn and shoddy, using Immedial and Chrome Colours

Shoddy and yarn, for obtaining best possible fastness to milling, are wool-dyed previously with

Anthracene Chrome Blue BB, F, FD, FR
Anthracene Acid Blue D, BB, 3B, BBN
Formyl Violet 10B, S4B, S5B
Brilliant Milling Blue B
Brilliant Milling Green B,

rinsed, then cotton-dyed for 2—3 hours or overnight in a bath of 30—35° C. (85—95 deg. F.) with

Immedial Direct Blue B, R, OD
Immedial Black NN conc, NBB conc, NNR conc., NLN conc, etc.

with the addition of the same weight of sodium sulphide crystals and double the weight of glucose as of dyestuff, as well as 3 oz soda and $2^1/_2$—3 lbs Glauber's salt crystals per 10 gallons liquor.

Directions page 162.

a) Simplest and cheapest method of production	b) Of better fastness to light
One-bath combinations of Diamine Dark Green N Oxy Diamine Black JE Oxy Diamine Blue 5G Diamine Steel Blue L, 2206J Diamine Yellow CP Diamine Fast Yellow A, B, FF, M Diamine Orange B Diamine Catechine G, 3G Oxy Diamine Brown G, 3GN Diamine Brown 3G shaded with Naphtol Blue Black Naphtol Dark Green G Brilliant Milling Green B Indian Yellow G, R, FF Tropaeoline OO Orange extra, II, IV, ENZ. Dye with 2 lbs salt per 10 gallons liquor as per directions page 152. *Shoddy materials*, in order to obtain sufficient brightness, are usually dyed by the two-bath method, being first wool-dyed in an acid bath with combinations of the following: Cyanole Green B, 6G Cyanole Fast Green G Azo Wool Blue SE, SER Acid Yellow AT Orange extra, II, IV, ENZ Tropaeoline G, OO Lanafuchsine SG then rinsed, and cotton-dyed in a cold to lukewarm bath with Diamine Black RMW Diamine Black BH Diamine Fast Yellow B Diamine Orange D with the addition of Glauber's salt, as per directions page 157.	One-bath combinations of Diamine Green B, G, CL, BO, 2209J, 2210J Diamine Dark Green N Diamine Black HW Diamine Fast Black F Diamine Yellow CP Diamine Fast Yellow A, B, FF, M, 3G Diamine Orange B, D, G Diamineral Brown G shaded with Naphtol Blue Black Naphtol Dark Green G Brilliant Milling Green B Indian Yellow G, R Orange extra, II, IV, ENZ Tropaeoline G, OO. Dye with 2 lbs Glauber's salt per 10 gallons liquor as under (a). By the two-bath method dye as under (a) with the dyestuffs named there which possess good fastness to light.

c) Of good fastness to milling for yarn and shoddy

One-bath combinations of

Diamine Green G
Diamine Bronze G
Diamine Fast Yellow B

} aftertreated with chromium fluoride or chrome alum and acetic acid,

or

Union Black S
Diamine Jet Black SS
Diamineral Blue R
Diamine Deep Blue B, R
Oxy Diamine Brown G, RN
Diamine Catechine G, 3G
Diamine Fast Yellow B, FF

} aftertreated with bichrome and acetic acid.

For shading the wool,

Brilliant Milling Green B
Anthracene Yellow C
Formyl Blue B

are used.

Dye yarn with 2 lbs Glauber's salt per 10 gallons liquor, and shoddy with 20% Glauber's salt crystals as per direction on page 152. Aftertreatment as indicated on page 154.

d) For dyeings fast to milling on yarn and shoddy, using Immedial and Chrome Colours

The wool is dyed first fast to milling with combinations of

Anthracene Chrome Blue G
Anthracene Chrome Brown D, DW, SWN
Anthracene Chrome Red A
Anthracene Acid Brown G
Anthracene Yellow BN
Brilliant Milling Green B;

after rinsing, the cotton is dyed in a fresh bath with

Immedial Dark Green B
Immedial Deep Green G
Immedial Green BB extra, GG extra
Immedial Brilliant Green G extra
Immedial Olive B, GG, 3G
Immedial Yellow Olive G
Immedial Yellow D
Immedial Yellow Brown EN
Immedial Cutch G, BG, BGG

adding an equal weight of sodium sulphide and double the weight of glucose as of dyestuff, as well as 3 oz soda and 1—3 lbs Glauber's salt crystals per 10 gallons liquor, and dyeing for 1—2 hours or overnight at 30—35° C. (85—95 deg. F)

Directions on page 172.

a) Simplest and cheapest method of production

For one-bath dyeings:

Union Black OJGJ, 1993J
Union Jet Black B

or

Oxy Diamine Black A, D, FFC, SA, JE, JEI, JW, JWF, US
Para Diamine Black B, BB, FFB, FF extra conc

in combination with

Naphtylamine Black 4B, 6B, X2B, X3B, 4BN, D, BB, BBN, BBV, 3BV, R, RNB, NBB
Alphanol Black BG, R

shaded if necessary with

Indian Yellow G, R, FF
Orange II, extra, IV
Formyl Violet 10B, 8B, 6B, S4B, S5B, HW
Formyl Blue B.

Dye with 2—4 lbs Glauber's salt crystals per 10 gallons liquor, boiling hot to boiling, according to requirement.
Directions on page 152.

Shoddy goods are frequently dyed by the two bath method in the milling machine with

Diamine Milling Black B conc., FG extra, FFB extra conc.
Para Diamine Black BB
Oxy Diamine Black UI, US

or with the same dyestuffs in the dye beck at 50—60° C. (120—140 deg. F.), the wool then being dyed in a boiling acid bath with

Naphtylamine Black S, ESN, 4BS, etc.
Naphtylamine Blue Black B, 5B.

Directions on page 159.

b) Of better fastness to light

One-bath dyeings:

Union Black P, BG, BB, 3B, S
Union Fast Black J
Diamine Fast Black F

in combination with

Naphtylamine Black 4B, 6B, X2B, X3B, 4BN, D, BB, BBN, BBV, 3BV, R, RNB, NBB
Alphanol Black BG, R
Neutral Wool Black G, B, 4B
Naphtol Blue Black
Naphtol Dark Green G

shaded with

Indian Yellow G, R, FF
Orange II, IV, extra
Formyl Violet 10B, 8B, 6B, S4B, S5B, HW
Formyl Blue B.

Dye as indicated under (a).

Ladies' costume cloths and linings are frequently dyed by the two-bath method by first dyeing the cotton with

Diamine Black BH, BHR

at 50—60° C. (120—140 deg. F.) with the addition of Glauber's salt, then diazotising and developing with Phenylene Diamine or Phenylene Diamine and Beta-Naphtol, and finally cross-dyeing in an acid bath with

Naphtylamine Black 4B, 6B, S, or ESN etc.
Naphtylamine Blue Black B, 5B.

Directions on page 160.

c) Of good fastness to milling for yarn and shoddy

One-bath dyeings:

Union Black S
Oxy Diamine Black UI, US
} aftertreated with bichrome and acetic acid

Oxy Diamine Black UI, US, SA, JEI, JB, JW, JWF
Para Diamine Black B, BB, FFB

aftertreated with

3% formaldehyde and
1% bichrome

according to directions on page 155.

Or,

*Oxy Diamine Black JW

coupled in the rinsing bath with
3% Nitrazol C
as per directions on page 155.

Dye yarn with 2—4 lbs Glauber's salt crystals per 10 gallons liquor, shoddy with 20—30% Glauber's salt crystals, at the simmer. (Directions on page 152.)

The aftertreatment, unless the liquor is to be used over again, is carried out in the dyebath after completing the dyeing, but to better advantage in a fresh liquor, either with bichrome and acetic acid for 1/2 hour at 50—60° C. (120—140 deg. F), with formaldehyde and bichrome for 1/2 hour at 70—80° C. (160—175 deg. F.) or with formaldehyde and acetic acid for 1/2 hour cold or lukewarm.

The colour marked with an asterisk (*) may be used as a black fast to cross-dyeing.

d) For dyeings fast to milling on yarn and shoddy, using Immedial and Chrome Colours

Shoddy is dyed with best possible fastness by wool-dyeing first with

Anthracene Acid Black DSN, SR, SBB
Anthracene Chrome Black F, FE, PPN extra, PF extra, PFB extra, PFBB extra,

according to Methods VIII and IX, pages 9 and 10, and rinsing and dyeing the cotton in a fresh bath charged with

7—10% Immedial Black conc.
7—10% sodium sulphide cryst.
14—20% glucose
3 oz soda
3 lbs Glauber's salt
} per 10 gallons liquor

Directions on page 162.

For dissolving Immedial Black, boil the dyestuff, sodium sulphide and glucose for 10—15 minutes, add this solution, the soda and Glauber's salt to the lukewarm dyebath, enter the material at 35° C. (95 deg. F.), and leave immersed in the liquor for 2—4 hours or even overnight until the cotton is sufficiently well covered.

Then rinse thoroughly, sour off weakly, and aftertreat with acetate or formate of soda; see directions on page 214.

The above-mentioned dyestuffs are exceedingly fast to light.

Dyeing of Unions containing Silk.

Fabrics consisting of wool, cotton and silk are a little more difficult to dye than goods of wool and cotton; their dyeing necessitates a good knowledge of the dyestuffs to be used, and of their behaviour towards the three different fibres.

The goods are produced either in one *solid shade* or in *two* or *three* shades; in the two latter cases either

1) the wool and silk are dyed to the same shade, the cotton being dyed a different shade, or
2) the cotton is dyed first, the wool and silk being dyed subsequently either the same or two different shades; or again
3) the wool is dyed first, the cotton and silk being dyed subsequently either the same or two different shades.

a) Solid Shades.

These are dyed with Diamine Colours in combination with wool dyestuffs by the one-bath method customary for unions. For this purpose such Diamine Colours are selected which, suitably applied, dye the wool, cotton and silk the same, or approximately the same, shade.

In the majority of cases, the goods, as with ordinary cotton and wool mixed goods, have to be shaded with neutral-dyeing wool dyestuffs which at a lower temperature go more strongly on to the silk and at a higher temperature are absorbed more readily by the wool fibre.

Diamine Colours which dye Wool, Cotton and Silk approximately the same shade.

Thioflavine S
Oxy Diamine Yellow GG, TZ
Diamine Fast Yellow 3G, M
Diamine Orange B, F
Diamine Catechine G, 3G
Diamine Brown R, M, BWA, GWA
Diamine Brown No. 40, 42, 44,
Oxy Diamine Brown G, 3GN
Diamineral Brown G
Union Brown 1926J, 2089J
Diamine Rose BD, GD
Diamine Scarlet B, 3B, HS
Diamine Red 4B, 5B
Diamine Fast Red F
Diamine Bordeaux B, S
Diamine Brilliant Bordeaux R
Diamine Violet N, 2205J
Oxy Diamine Violet B, G
Diamine Blue RW
Diamine Bengal Blue G
Oxy Diamine Blue 5G, 3G, G

Diamine Steel Blue L, 2206J	Diamine Black HW
Diamine Green B, G, CL, 2209J, 2210J	Union Black S
Diamine Dark Green N	Oxy Diamine Black SOOO, N, JW, JWF, JB.

Wool Dyestuffs for the shading of Wool and Silk.

Milling Yellow O	Formyl Violet S4B
Indian Yellow G, FF	Alkaline Violet CA, C
Orange extra, R, EN	*Lanacyl Violet B
*Brilliant Cochineal 4R	*Lanacyl Blue BB, R
Roccelline	*Lanacyl Navy Blue B, BB
Croceïne AZ	*Naphtol Blue G, R
Rosazeïne B	Wool Blue OD, OC, OJF
Irisamine G	*Naphtol Blue Black
Wool Red B, BG	*Naphtol Dark Green G
Milling Red G	Alphanol Blue BR extra
Brilliant Milling Green B	Alphanol Black BG, R
Brilliant Milling Blue B	Neutral Wool Black B, G.
Formyl Blue B	

The dyestuffs marked with an asterisk (*) dye only the wool, leaving the silk practically unstained.

Dyeing Directions for Solid Shades.

Dye with

$^1/_2 - 2$ lbs Glauber's salt crystals per 10 gallons liquor, according to the depth of shade required, and the requisite Diamine Colours in combination if necessary with the wool dyestuffs suited for the purpose; enter the goods at 50—60° C. (120—140 deg. F.), raise gradually to the boil, boil for 20—30 minutes, and finally run for about $^1/_2$ hour in the cooling bath.

If the *wool* is too pale, the temperature is raised once more to boiling temperature and the wool shaded if necessary with wool dyestuffs; prolonged boiling is to be avoided as it causes the dyestuff to come off the cotton and silk, boiling on to the wool which is then apt to turn out too dark. If the *cotton* and *silk* are too pale, a temperature below boiling point (50—60° C. or 120—140 deg. F.) is maintained, the necessary Diamine Colours and wool dyestuffs being added to the bath. The *silk* alone is best shaded in a fresh cold to lukewarm bath with the addition of about 5% acetic acid with Acid Colours which go easily on to silk and stain wool as little as possible.

Dyestuffs for subsequently dyeing the Silk.

Milling Yellow O, OO	Brilliant Milling Green B
Indian Yellow G	Tetra Cyanole V, A
Tropaeoline RNP	Cyanole FF, extra
Orange ENZ, R	Indigo Blue N, SGN
Croceïne AZ	Formyl Blue B
Brilliant Croceïne M	Brilliant Milling Blue B
Milling Red FR	Water Blue B
Amaranth	Wool Blue TB
Azo Orseille BB	Formyl Violet S4B, 10 B
Lanafuchsine 6 B	Acid Violet 6 BS
Acid Magenta	Naphtol Blue G, R
Rosazeïne B	Naphtol Blue Black
Acid Green extra conc.	Naphtylamine Black ESN.

The Basic Colours mentioned on pages 136 and 137 go particularly well on to silk when dyed in a cold bath with the addition of a little acetic acid, but they stain the wool more than these Acid Colours and also go on to the cotton fibre.

The following are useful combinations of dyestuffs for producing solid shades by the one-bath method:

For Pink:

Diamine Rose BD
Rosazeïne B

For Red:

Diamine Scarlet B or
Diamine Red 4 B
shaded if necessary with
Rosazeïne B.

For Claret:

2 % Diamine Bordeaux S
2 % Diamine Bordeaux B
0,3 % Diamine Orange D.

For Prune:

4,00 % Oxy Diamine Violet B
0,25 % Formyl Violet S4B.

For Coffee:

4 % Diamine Brown M
0,3 % Formyl Blue B.

For Yellow-Brown:

3 % Diamine Brown R
0,3 % Diamine Orange D
0,1 % Formyl Blue B.

For Pale Green:

1,25 % Diamine Green B
1 % Diamine Sky Blue FF
1,25 % Oxy Diamine Yellow TZ
1,1 % Brilliant Milling Green B
or
3 % Diamine Green 2209 J.

For Dark Green:

4 % Diamine Green B or Diamine Dark Green N
0,4 % Brilliant Milling Green B.

For Navy Blue:

2 % Diamineral Blue R or CV
1 % Oxy Diamine Black JW or JWF
0,5 % Formyl Blue B
1,25 % Formyl Violet 10 B.

For Black:

8 % Oxy Diamine Black JB, JW or JWF
0,5 % Formyl Violet 10 B.

For the production of pale shades, it is frequently an advantage to dye the wool and silk approximately to shade in an acid bath and to subsequently cotton-dye with Diamine Colours in a fresh, cold bath in accordance with the directions on pages 157 and 158 without however adding any soda or ammonia. In this way it is easier very often to produce a good uniform shade on the different fibres.

The dyebaths do not exhaust, especially with dark shades, and may be preserved for dyeing further lots.

b) Multi-Coloured Dyeings.

The following dyestuffs are very suitable for dyeing solid shades on wool and silk in cases where the cotton is dyed some other shade subsequently:

For pale shades:

China Yellow B	Tetra Cyanole V, SF, extra
Indian Yellow G, R, FF	Indigo Blue N, SGN
Orange extra, R	Acid Green extra conc.
Azo Orseille BB	Fast Acid Green BN
Rosazeïne B	Cyanole Fast Green G
Cyanole extra FF, AB	Acid Violet 6BS, 6BC.

For medium and deep shades:

Indian Yellow G, R, FF	Formyl Violet S4B, 6B, 8B, 10B
Tropaeoline OO, RNP	Alkaline Violet C, CA
Orange EN	Water Blue B, R, RB
Croceïne AZ	Wool Blue TB
Brilliant Croceïne, all brands	*Naphtylamine Black 4B, 6B, R
Scarlet EC	*Naphtyl Blue Black N
Roccelline	Neutral Wool Black B, G, *4B
Tetra Cyanole A	*Alphanol Black BG, R
Brilliant Milling Green B	*Gloria Black B, I, II
Brilliant Milling Blue B	*Anthracite Black B, R.
Formyl Blue B	

Dye with the addition of
10% Glauber's salt and
10—15% bisulphate of soda, or with
15—20% Glauber's salt and
4—5 % sulphuric acid;
enter the goods at 60° C. (140 deg. F.), raise in ½ hour to the boil, and run for ½ hour at boiling temperature. By prolonged boiling in the presence of only a small quantity of acid the wool is apt to assume a deeper shade than the silk; the latter on the other hand is more strongly dyed at a lower temperature and with a larger quantity of acid.

Of the above-named dyestuffs, those marked with an asterisk (*) are dyed with 10% Glauber's salt and 10% acetic acid 30%, or with 3—4% formic acid 85%. Enter the goods at 60° C. (140 deg. F.), raise in ½ hour to the boil, boil gently for ½ hour, then run for another ½ hour in the bath whilst cooling off. If the wool has by then attained the desired shade, the silk may be given a subsequent shading in a fresh, cold bath with the dyestuffs named on page 208.

The cotton is dyed subsequently as indicated on pages 157 and 158 without however adding any soda or ammonia.

2. For first dyeing the cotton portion of goods of which the wool and silk part is to be dyed subsequently, dyestuffs fast to acid cross-dyeing must be used. Diazotised and developed colours are used for this purpose.

For Black:

Diamine Black BH, BHN, BHR
Diamine Azo Black B
} diazotised and developed with Beta Naphtol or Beta Naphtol and Phenylene Diamine.

For Blue:

Diaminogene Blue NB, NA, 3RN
Diamine Azo Blue RR
} diazotised and developed with Beta Naphtol.

For Claret:

Diamine Azo Bordeaux B

Dye at 40—50° C. (105—120 deg. F.) with the addition of 1—1½ lb Glauber's salt crystals per 10 gallons liquor, adding 3—4½ oz soap per 10 gallons to prevent the dyestuffs as far as possible from going on to the wool and silk.

After rinsing lightly, diazotise and develop (see page 160), then rinse again, and dye the wool and silk to any required shade. The wool is dyed as indicated below, under (3), the silk according to the directions on pages 207 and 208.

3. Dyeing the wool so as to leave the silk and cotton white.

The following dyestuffs are well adapted for dyeing the wool:

For compound shades (grey, mode, brown, olive etc.):

Acid Yellow AT
Naphtol Yellow S
Orange GG
Lanafuchsine SG, SB
Cyanole FF, extra
Azo Wool Blue C.

For Yellow and Orange:

Naphtol Yellow S
Acid Yellow AT
Fast Yellow S
Orange GG
Lanafuchsine SG, for shading towards Red.

For Pink, Red and Claret:

Eosine 3G, GGF, BN
Eosine Scarlet B
Brilliant Scarlet 6R
Crystal Scarlet 4R
Brilliant Cochineal 2R
Lanafuchsine SG, SB, 6B
Naphtol Red C
Azo Wool Violet 7R.

For Navy and Deep Blue:

Azo Wool Blue C
shaded if necessary with
Azo Wool Violet 7R
Lanafuchsine 6B
Orange GG
Acid Yellow AT.

For Purple:

Azo Wool Violet 7R
shaded with
Azo Wool Blue C
Cyanole FF, extra.

For Green:

Acid Green extra conc., 5G
Naphtol Green B
Naphtol Dark Green G
shaded with
Acid Yellow AT
Orange GG
Azo Wool Blue C.

For Black:

Naphtylamine Black EFF
for jet black, shaded with
Orange GG
Acid Yellow AT.

Colours, with the exception of pinks and reds produced with Eosine and Eosine Scarlet B, are dyed with

10% Glauber's salt crystals
8—15% acetic acid 30% or
$1\frac{1}{2}$—$2\frac{1}{2}$% formic acid 85%

and the requisite quantities of dyestuff; enter the goods at the boil, boil hard for about an hour, rinse, and sour off with acetic or formic acid in the last rinsing bath. The severer the boiling and the more acid the dyebath contains, the less will the silk be stained.

Eosine or Eosine Scarlet B are dyed with

10 % Glauber's salt crystals
2—5 % acetic acid 30 %.

Enter the goods at 50—60° C. (120—140 deg. F), raise in $^1/_2$ hour to the boil, boil for 30—40 minutes, rinse, and brighten as indicated above.

For Blacks, charge the bath with

10 % Glauber's salt crystals,
2 % formic acid 85 %

and the requisite dyestuff, enter the goods at boiling temperature, boil for $^3/_4$ hour, then add gradually another

2 % formic acid 85 %;

boil well for a further 20—30 minutes, and rinse. The silk is thereupon cleared if necessary, either with a solution of hydrosulphite or in some other suitable manner, and dyed with suitable dyestuffs (see page 209) to the desired shade in a cold to lukewarm acidulated bath. For directions for clearing the silk see page 224.

The subsequent dyeing of the cotton is then carried out in a cold bath according to the directions on pages 157 and 158, omitting however any addition of soda or ammonia.

The Application of Acetate or Formate of Soda for Union Fabrics.

Unions dyed in an acid bath, in spite of the most careful rinsing, are apt to retain some of the acid which during the storage of goods may have a deleterious effect on the cotton portion.

In order to neutralise any effect of this kind on the part of the acid, it is well after rinsing to take the goods through a cold bath containing $4^1/_2$—8 oz acetate or formate of soda per 10 gallons, and to dry without rinsing again.

The same treatment is very advantageous for union goods which have been bleached with sulphurous acid or in the sulphur stove.

Particularly is this treatment to be recommended for union fabrics of which the cotton portion has been dyed with Sulphide Blacks.

The impregnation with acetate or formate of soda may be carried out either in the washing machine or by padding in the padding machine. In the latter case the trough is charged with 8 oz of the afore-mentioned salts per 10 gallons water, further 2 % (reckoned on the weight of the material) being added gradually for replenishing the liquor. The goods treated in this manner are dried without rinsing.

Dyeing of Materials composed of Wool and Silk.

Dyeing of Materials composed of Wool and Silk.

Dyeing of Gentlemen's Suitings.

See page 91.

Dyeing of Ladies' Dress Materials.

Preliminary Treatment of the Materials. For goods consisting of grège warp and worsted weft it is recommended after singeing to resort to hot crabbing or steaming, and to boil off in a boiling hot soap bath. Goods with effect threads of boiled-off or Chappe Silk (dress materials etc.) are singed or cropped and crabbed or steamed, then well washed with soap and soda. The dye-vats customary for wool piece-dyeing, worked either by machinery or by hand are used for these goods.

Fabrics of wool and silk are produced either in one shade (plain) or in two shades.

I. Plain Shades.

Solid shades may be dyed on the wool and silk either

a) with Acid Colours, which are used principally and are available for practically any shade, or

b) with Diamine Colours which are used more for the production of dyeings fast to water and washing.

Basic Colours are used less frequently, although they dye wool and silk uniformly, particularly in light shades.

a) Acid Colours.

The following are used principally:

For Cream, Yellow and Orange:

China Yellow B
Indian Yellow, all brands
Orange EN, R, extra

For Pink:

Rosazeïne B
Irisamine G

in combination if necessary with

Acid Magenta or Erythrosine B.

For Red and Claret:

Brilliant Croceine, all brands
Croceine AZ
Scarlet EC
Roccelline
for claret, saddened with
Acid Violet 6 BS
Formyl Violet S 4 B
Tetra Cyanole A.

For Purple:

Formyl Violet, all brands
Acid Violet 6 BS, 6 BC.

For Blue:

Cyanole FF, extra (principally for pale shades)
Tetra Cyanole, all brands
Brilliant Milling Blue B
Formyl Blue B
Pure Soluble Blue
Water Blue B, R
Indigo Blue N, SGN
Alkaline Blue, all brands

For Navy Blue:

Solid Blue R, 3 R
Wool Blue TB
shaded if necessary with
Formyl Violet, all brands
Brilliant Milling Green B
and saddened with
Anthracite Black R.

For Green:

Cyanole Fast Green G
Brilliant Milling Green B
Acid Green extra conc.
shaded with
China Yellow B
Indian Yellow, all brands
Tetra Cyanole A
Acid Violet 6 BS
for dark green saddened with
Formyl Violet S 4 B
Wool Blue TB
Orange EN.

For Grey and Mode Shades:

Combinations of

Indian Yellow G
Orange extra
Azo Orseille BB
Tetra Cyanole V
Cyanole Fast Green G.

For Brown and Olive:

Combinations of

Indian Yellow G, FF
Tropaeoline RNP
Orange extra
Croceïne AZ
Roccelline
Tetra Cyanole A
Brilliant Milling Green B.

For Black:

*Gloria Black B, I, II
*Anthracite Black B, R
Naphtylamine Black 4B, 6B
*Neutral Wool Black B, G, 4B

shaded if necessary with

Formyl Violet
Formyl Blue B
Brilliant Milling Green B or with
Indian Yellow R
Tropaeoline RNP (for jet black).

Dye with the addition of

10% Glauber's salt crystals and
10—15% bisulphate of soda, or with
15—20% Glauber's salt crystals and
4—5 % sulphuric acid;

enter the goods at about 60° C. (140 deg. F.), raise in 1/2 hour to the boil, and run for about 1/2 hour at boiling temperature. By prolonged boiling and using a reduced quantity of acid, the wool is apt to assume a deeper shade than the silk, whereas at a lower temperature and by adding a larger quantity of acid the silk is better covered. It is an advantage too, particularly for rich shades, to add only about one-half the requisite quantity of dyestuff at first, then to boil for about 1/2 hour, and thereupon to add the other half of the dyestuff, completing the dyeing without again raising the temperature.

The dyestuffs marked with an asterisk (*) are dyed with the addition of 10% Glauber's salt and 10% acetic acid or 3—4% formic acid.

Occasionally Basic Colours are used along with the others in the acid bath for the purpose of saddening the shade of the silk

Of these, *Safranine S No 150*, *Methyl Violet 2B*, *Thioflavine T*, *Indazine M*, are suitable products, but should only be applied in very small quantities. The silk may further be topped subsequently in a fresh bath with any of the dyestuffs mentioned on pages 225 and 226.

Some of the Acid Colours mentioned above may be applied also in a weakly alkaline soap bath, particularly on goods bleached previously with peroxide of sodium, because purer shades are then obtained than in an acid bath.

The following are particularly well suited:

Alkaline Blue, all brands	Rosazeïne B
Alkaline Violet CA, C	Indian Yellow G, R
Formyl Violet S4B	Orange EN
Brilliant Milling Blue B	Brilliant Milling Green B.

Dye at the simmer with the addition of $1^1/_2$—2 lbs soap and 1—2 lbs phosphate of soda to every 100 gallons of liquor, in the case of Alkaline Blue with 3—5% borax or borax and soap. The dyestuff will exhaust better when adding 2—5 lbs Glauber's salt per 100 gallons liquor.

Hard water should be corrected with a little soda, but not any more should be added than is necessary for this purpose as the wool is otherwise apt to assume a yellowish tint.

The dyebaths may be preserved for further use. When dyeing subsequent lots it is sufficient to add one-fifth of the weights of soap, phosphate of soda and borax used for the first bath.

After dyeing, the goods should always be well rinsed, brightened with acetic acid, and dried; the dyeings obtained with Alkaline Blue, after being well rinsed, are developed hot with sulphuric acid.

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b) Diamine Colours.

The following are particularly well suited:

Thioflavine S	Diamine Bordeaux S
Oxy Diamine Yellow TZ	Diamine Brilliant Bordeaux R
Diamine Fast Yellow FF, 3G	Oxy Diamine Violet B, R
Diamine Yellow CP	Diamineral Brown G
Diamine Orange B, F	Diamine Catechine G
Diamine Rose BD, GD	Diamine Brown 3G, R, V, M, B
Diamine Scarlet B, 3B	Oxy Diamine Brown G, 3GN
Diamine Red 4B, 5B	Diamine Fast Brown G, R
Diamine Fast Red F	Diamine Sky Blue FF.

Diamine Blue RW	Diamine Dark Green N
Diamine Brilliant Blue G	Diamine Grey G
Diamine New Blue R, G	Diamine Black HW
OxyDiamine Blue B, R, G, 3G, 5G	Oxy Diamine Black
Diamine Steel Blue L	JW, JWF, JB, JEI
Diamine Green B, G, CL	Oxy Diamine Black SOOO.

Dye with the addition of

½—2 lbs Glauber's salt crystals per 10 gallons liquor (according to the depth of shade);

enter the goods at about 60° C. (140 deg. F.), raise gradually to the boil, run for about one hour in a boiling hot bath or at the simmer, rinse, and brighten with acetic acid. In the case of blue Diamine Colours, it is recommended to add 2—4% acetic acid.

Prolonged boiling causes the dyestuffs to go more strongly on to the wool, silk on the other hand being dyed to best advantage at 60° C. (140 deg. F). If necessary, the silk may be topped subsequently as indicated on page 225.

c) Basic Colours.

The following Basic Colours are very well adapted for dyeing materials composed of wool and silk:

Safranine, all brands	Tannin Heliotrope
Magenta Ia	Thioflavine T
Brilliant Green Crystals extra	Solid Green crystals O
Crystal Violet 5B bluish, 10B	Methyl Violet, all brands.

Dye in a boiling hot neutral bath without any other ingredients, then rinse, and brighten with a little acetic acid.

II. Two-Coloured Effects.

Two-coloured effects are produced on fabrics composed of wool and silk by first dyeing the wool with Acid Colours which go principally on to the wool fibre and stain the silk as little as possible, and then dyeing the silk cold in a second bath.

If the silk has absorbed too much dyestuff during the wool dyeing so that it does not appear clear enough or so that clear shades are not obtainable on the silk in the subsequent dyeing, it has to be cleared by a special treatment as indicated on page 224

a) Dyestuffs for dyeing the wool first.

For Cream, Yellow and Orange:

Naphtol Yellow S
Acid Yellow AT
Fast Yellow S
Orange GG
Lanafuchsine SG (for shading towards Red).

For Pink:

Eosine 3 G, BN
Eosine Scarlet B
Lanafuchsine SG, SB
Brilliant Scarlet 4 R, 6 R.

For Red and Claret:

Lanafuchsine SG, SB, 6 B
Brilliant Scarlet 4 R
Naphtol Red C
Amaranth
} best suitable for the purpose

Brilliant Scarlet 6R
Crystal Scarlet 6 R
Scarlet FR, F2R, F3R
Brilliant Cochineal 2R
Acid Magenta (in pale shades).

For Purple:

Azo Wool Violet 7 R
shaded if necessary with
Azo Wool Blue C
Cyanole FF (for bright pale shades).

For Blue and Navy Blue:

Cyanole FF, extra (for pale and medium blue)
Azo Wool Blue C
shaded if necessary with
Lanafuchsine 6 B
Azo Wool Violet 7R
Orange GG
Acid Yellow AT.

For Green:

Acid Green extra conc.
Acid Green 5G
Naphtol Green B (for dark Green)

shaded if necessary with

Azo Wool Blue C
Acid Yellow AT
Orange GG.

For compound shades (grey, mode, brown, olive):

Combinations of

Acid Yellow AT
Naphtol Yellow S
Orange GG
Lanafuchsine SG, SB
Azo Wool Blue C
Cyanole extra, FF.

For Black:

Naphtylamine Black EFF

shaded if necessary with

Azo Wool Violet 7R (for blue-black)
Acid Yellow AT } (for jet black).
Orange GG }

Dyeing Directions for Colours:

Charge the bath with

10% Glauber's salt crystals and
8—15% acetic acid 30%

or

$1^1/_4$—$2^1/_2$% formic acid 85%

and the requisite amount of dyestuff, entering the goods straightway into the boiling bath and boiling hard for about an hour.

Then rinse well, and sour off with acetic or formic acid added to the last rinsing bath.

For pinks and reds produced with Eosine and Eosine Scarlet, charge the bath with

10% Glauber's salt crystals,
2—5% acetic acid 30% and the requisite dyestuffs.

Enter the goods at 50—60° C. (120—140 deg. F), raise to the boil within $^1/_2$ hour, boil for 30—40 minutes, rinse, and brighten as indicated above.

As small additions as possible of acid, and a high temperature, are conducive to clearness of the silk; silk is on the other hand stained more or less when using strongly acid baths or by dyeing without boiling.

In order to obtain as high a temperature as possible in the dye-bath, a second steam-coil may be introduced into the dye vessel.

Dyeing Directions for Black.

Charge the bath with

10 % Glauber's salt crystals
2 % formic acid 85 % and, say,
8 % Naphtylamine Black EFF;

enter the goods at boiling temperature, boil for 3/4 hour, add

2 % formic acid 85 %

in several portions, and run for a further 20—30 minutes in a strongly boiling bath; then rinse.

b) Clearing the Silk.

The dyestuffs and combinations enumerated before have been selected as leaving silk in pale and medium shades almost entirely unstained. When dyeing deep shades it is practically impossible to prevent the silk from becoming slightly tinted, and it may therefore be necessary to subject the materials subsequently to a clearing process in order to strip the dyestuff which the silk has absorbed.

For this purpose the pieces are entered into a fresh bath of 60—80° C. (140—175 deg. F.) to which 1/2—1 oz oxalate of ammonia per 100 gallons liquor have been added, and are allowed to run for 10—20 minutes in this bath until the silk is sufficiently decolourised, then rinsed, and brightened.

If very soft or condensed water is used, the oxalate of ammonia may be omitted, the silk being cleared simply with plain water.

More effective stripping may if necessary be attained by adding about 1 1/2 oz acetate of ammonia* per 10 gallons liquor; similarly good results are also obtained with bran.

By the first method the wool loses only very little colour or none at all; by employing the second more effective method, however, some of the colour is lost, which fact has to be taken into account in the dyeing.

In dyeing black and white effects with *Naphtylamine Black EFF*, the silk assumes a slightly bluish-grey shade, which is removed with hydrosulphite by the following method:

* Acetate of ammonia is prepared by mixing
10 oz ammonia (0.913 sp. g. or 24 % and
26 1/4 oz acetic acid (8° Tw or 30 %).
The solution should be neutral and should not materially change either blue or red litmus paper.

Prepare a bath of 50—60° C. (120—140 deg. F) with
$2^1/_2$—3 gallons acetic acid 30 %
4—5 gallons hydrosulphite solution* } per 100 lbs of goods.

Enter the goods immediately, and work until the silk is sufficiently white (about 20—30 minutes). Then rinse very thoroughly, sour off in a bath containing about 5 % sulphuric acid, calculated on the weight of the goods, rinse again, and brighten finally with acetic or formic acid.

If necessary the silk may be lightly blued with slight quantities of Formyl Violet, Brilliant Milling Blue or Water Blue added to the brightening bath.

It is advisable to expose the goods as little as possible to the air during the stripping process, but to keep them entirely immersed in the stripping liquor, moving them slowly to and fro with a stick.

c) Dyestuffs for Dyeing the Silk subsequently.

In the case both of solid shades and of two-coloured goods the subsequent dyeing of the silk is carried out in a cold weakly acid bath with dyestuffs which go strongly on to the silk and which stain the wool fibres as little as possible.

It is helpful to the dyeing of the silk to warm the liquor a little, say up to about 30—45° C. (85—115 deg. F.), but at such temperature the wool is stained to some extent also.

The following Acid, Diamine and Basic Colours come into consideration as suitable dyestuffs for the purpose:

a) Acid Colours:

Milling Yellow O, OO	Lanafuchsine SG
Tropaeoline RNP	Amaranth B
Brilliant Croceïne, all brands	Acid Magenta
Croceïne AZ	Rosazeïne B
Milling Red FR	Formyl Violet S4B, 10B
Azo Orseille BB	Acid Violet 6BS

* Preparation of the hydrosulphite solution:
1 gallon bisulphite of soda of 66° Tw. is mixed with
1 gallon cold water, into which
1 lb zinc dust is introduced whilst stirring.
Stir for some time, allow to settle, filter if necessary, and use the clear solution.

As the hydrosulphite solution decomposes easily and thus becomes ineffective, it should always be prepared fresh and be added to the bath only just before entering the goods.

Acid Green extra conc.
Fast Acid Green BN
Brilliant Milling Green B
Brilliant Milling Blue B
Formyl Blue B
Cyanole FF
Tetra Cyanole V, A
Water Blue B
Wool Blue TB
Naphtol Blue G
Naphtol Blue Black
Naphtylamine Black ESN.

b) Diamine Colours:

Oxy Diamine Yellow TZ
Diamine Yellow CP
Oxy Diamine Red S
Diamine Rose BD
Diamine Heliotrope B
Diamine Sky Blue, FF
Diamine Blue 2B, 3B.

c) Basic Colours:

Thioflavine T
Paraphosphine G
Tannin Orange R
Chrysoïdine F
Bismarck Brown GG
Safranine, all brands
Tannin Heliotrope
New Methylene Blue N
Solid Green crystals.

Dye cold to lukewarm with the addition of about 5% acetic acid, Acid Colours with 2—4% sulphuric acid. Rinse, and brighten.

Dyeing of Half-Silk.

(Cotton and Silk.)

Dyeing of Half-Silk.
(Cotton and Silk.)

For one and two-coloured styles half-silk is usually dyed with *Diamine Colours;* in some cases *Basic Colours* are likewise used, on a tannin mordant, particularly for bright shades of pink, red, green and violet. *Immedial Colours* moreover are used for blacks and two-coloured styles when particularly good fastness is required. *Acid* or *Basic Colours* serve for topping or shading.

Particulars of the dyestuffs used in practice and their behaviour towards the silk and cotton fibres respectively will be found in the following tables.

For dyeing, ordinary rectangular wooden vats are used in which piece-goods are turned by means of a moveable winch; superior qualities are frequently also dyed on the jigger. Ribbons are hung over rods and worked in the liquor.

Previous to the dyeing, the goods should always be boiled off well.

Diamine Colours which dye the silk and cotton the same or approximately the same shade.

Thioflavine S
Oxy Diamine Yellow GG, TZ
Diamine Fast Yellow B, M, FF, 3G
Diamine Yellow CP, N Powder
Diamine Orange B, F
Oxy Diamine Orange G, R
Diamine Rose BD, GD, BG
Diamine Scarlet B, 3B, HS
Diamine Purpurine B, 3B, 6B, V
Diamine Red 5B, 6B, 10B, D
Diamine Violet Red
Diamine Fast Red F
Diamine Bordeaux B, S, VRO
Diamine Brilliant Bordeaux R
Diamine Brown 3G, R, M, OJDD, BWA, GWA, 30a, 33, 36, 37, 41, 42a, 43.
Oxy Diamine Brown G, 3GN, RN
Diamine Catechine G, 3G, B
Diamineral Brown G
Diamine Fast Brown R, G
Diamine Blue RW
Diamineral Blue B, 3B
Diamine Bengal Blue G
Diamine Steel Blue L
Diamine Dark Blue B
Diamine Grey G
Diamine Green G, B, CL
Diamine Dark Green N
Diamine Black HW
Union Black S
Oxy Diamine Black JE, JEI, JB, JW, FFC, BM, 010146, UI, US
Diaminogene B, BR
Oxy Diaminogene OT, FFN, EM
Diamine Black BH
(diazotised and developed)

For dyeing directions see page 231.

Diamine Colours which dye the wool and silk more or less different shades, or the silk a lighter shade than the cotton.

Diamine Brilliant Scarlet S
Diamine Brilliant Blue G
Diamine Blue 52, 53, 54, 55, 56, BG, BX, 3R, NC
Diamineral Blue R, CV
Diamine Bengal Blue R
Oxy Diamine Blue 5G, 3G, G, B, R, 3R
Diamine Azo Blue R, 2R, 51
Diamine Fast Blue G, FFB, FFG
Diamine Violet N, BB
Oxy Diamine Violet B, G, R
Diamine Heliotrope O, B, G
Diamine Bronze G
Diamine Brown B, S
Diamine Black BH, BHS conc.
Oxy Diamine Black SOOO
Para Diamine Black B, BB, FFB, FF extra conc.

Dyeing Directions for Colours.

	Dye pale shades with	medium shades with	
Soap	3—6 oz	3—6 oz	per 10 gallons liquor,
Soda	$^3/_4$—1$^1/_2$ oz	$^3/_4$—1$^1/_2$ oz	
Glauber's salt crystals	0—8 oz	1—2 lbs	

using as soft water as possible; boil up the bath charged with the dyestuff and all the ingredients, and dye for about an hour. In the case of pale shades it is recommended not to work at a higher temperature than 50—60° C. (120—140 deg. F). After dyeing, rinse in soft water or water to which a little soda has been added, brighten with acetic acid, and dry, or top and shade according to requirement with Basic or Acid Colours (see page 223).

Dyeing of Half-Silk.

Diamine Colours which stain the silk slightly or not at all, but which dye the cotton strongly and are suitable for producing two-coloured effects.

Diamine Fast Yellow A, AGG
Direct Rose T
Diamine Orange D, G
Diamine Fast Scarlet GG, 4BN, 6BS, 6BGN, 8BN
Diamine Sky Blue, FF, FFS
Diamine Pure Blue A
Diamine Blue 2B, 3B
Diamine Black BH, BHS conc.
dyed direct or diazotised and developed with Phenylene Diamine, or Beta Naphtol and Resorcine.

Directions for Dyeing.

Dye at 70—80° C. (160—175 deg. F.) with

$^1/_8$—1 lb soap
$1^1/_2$—3 oz soda
0—1 lb Glauber's salt crystals

per 10 gallons liquor.

By maintaining an elevated temperature the silk is dyed more strongly, whereas at a lower temperature the cotton principally is dyed.

If the cotton is to be dyed black and the silk to remain undyed, the goods should first be dyed as described above with Diamine Black BH or BHS conc. and after rinsing diazotised, and developed as described on page 234. Instead of Phenylene Diamine, equal parts of Beta Naphtol and Resorcine dissolved in $1^1/_2$ times their weight of caustic soda lye are frequently used.

Acid Colours which dye only the silk, staining the cotton not at all or only very slightly.

*Milling Yellow O, China Yellow B
Indian Yellow G, R, FF
Orange II, ENZ, GG
Brilliant Croceïne, all brands
*Scarlet FR, F2R, F3R
Crystal Scarlet 6R
*Acid Magenta, *Rosazeïne B
Azo Orseille BB
*Brilliant Orseille C
*Azo Rubine A, *Milling Red G, R
Water Blue RB
Solid Blue R, 3R
Cyanole extra, *Formyl Blue B
*Formyl Violet S4B
Aniline Grey B, Nigrosine
*Brilliant Milling Blue B
*Brilliant Milling Green B
*Acid Green extra conc., B
*Naphtol Blue R
*Naphtylamine Black S.

Directions for Dyeing.

These dyestuffs may be used either for dyeing the silk before the cotton or for subsequently shading the silk.

If the first method is employed, the goods are dyed in a boiling hot bath with the addition of 3—5% sulphuric acid, and then rinsed; in the subsequent shading it is best to maintain a temperature of 30—50° C. (85—120 deg. F.)

If the cotton is to remain perfectly white, the goods are rinsed after dyeing the silk and treated in a lukewarm bath of Eau de Javelle. Dissolve 10 lbs chloride of lime and 10 lbs soda ash each in 1 gallon water, pour the solutions together and allow to settle, using the clear liquid adequately diluted.

The dyestuffs marked with an asterisk (*) possess very good fastness to chloring and allow of pure white cotton effects being obtained.

Basic Colours suitable for topping and shading in fresh baths, or which may be used on goods previously mordanted with tannin and antimony.

Thioflavine T, TCN
Paraphosphine G, R
Tannin Orange R Powder
Chrysoïdine crystals, FN
Safranine, all brands
Tannin Heliotrope
Magenta Ia
Cerise Ia
Crystal Violet 5B bluish, 10B
Methyl Violet, all brands
New Methylene Blue N, GG, R, 3R
New Blue R, B, L
Indazine M
Solid Green crystals O
Brilliant Green crystals extra
Bismarck Brown FF, FFG.

Directions for Dyeing.

These Basic Colours are used either alone or together with Acid Colours for topping dyeings which have been bottomed with Diamine Colours according to the directions on page 231; or they may be dyed on a tannin and antimony mordant especially for producing very bright shades.

In the first case dye cold to lukewarm with the addition of 5–10 % acetic acid or 3—5 % hydrochloric acid, rinse, and brighten.

For the production of very bright plain or two-coloured shades, first dye the silk boiling hot with suitable Acid Colours (see page 232), then, rinse, and treat at 30° C. (85 deg. F.) for 3–6 hours in as short a bath as possible containing 3—5 % tannin reckoned on the weight of the goods. Hereupon take the goods through the cold antimony bath (2—4 % of the weight of the goods), rinse, and dye cold with Basic Colours. It is frequently necessary for two-coloured effects to clear the silk subsequently by treating in a hot soap bath.

Immedial Colours for producing solid shades of particularly good fastness.

Immedial Yellow D
Immedial Orange C
Immedial Cutch O, G, BG, BGG
Immedial Dark Brown B, BR, RR
Immedial Dark Brown D conc.
Immedial Maroon B conc.
Immedial Bordeaux G conc.
Immedial Prune S
Immedial Direct Blue B, R, OD
Immedial Dark Green B
Immedial Olive B, GG, 3G
Immedial Black AZ
Immedial Black BZ conc.
Immedial Black FF extra.

Immedial Black BZ conc. is dissolved with double its weight, the other dyestuffs with their own weight, of sodium sulphide.

Dyeing Directions for Solid Shades (Colours).

Dissolve the dyestuff with the requisite quantity of sodium sulphide and double or three times the weight of glucose as of sodium sulphide, boil up for 5 or 10 minutes, add this solution to as short a bath as possible to which 3 oz soda, 3 oz Turkey red oil and 1 lb Glauber's salt have been added, and dye for about half an hour at 80—90° C. (175—195 deg. F.). Then lift immediately, rinse, and brighten in acetic acid. The topping is done as described in the opposite column.

For the production of two-coloured effects see page 235.

Goods dyed with Immedial Black are treated finally with 8 oz acetate of soda per 10 gallons water.

Dyeing Directions for Blacks.

a) For Blacks dyed direct,

Oxy Diamine Black JE, JW, JB, FFC, BM,
Union Black S 010146, UI, US

shaded if necessary with

Diamine Dark Green N
Diamine Fast Yellow A, B, FF
are used.

Dye boiling hot for 1—1½ hours with
7—10% dyestuff and
¾—1½ oz soda ash
1½—3 lbs Glauber's salt crystals } per 10 gallons liquor.

After dyeing, rinse, and top with New Methylene Blue N or Naphtylamine Black 4B in a lukewarm bath slightly acidulated with acetic acid.

b) For Blacks, diazotised and developed:

Diaminogene B, BR
Oxy Diaminogene OT, FFN, EM
Diamine Black BH

shaded if necessary with

Diamine Dark Green N
Diamine Fast Yellow A
Neutral Wool Black B, G
Naphtylamine Black 4B.

Dye boiling hot for 1—1½ hours with

1—2% acetic acid } of the weight of the goods
8—10% dyestuff }
2—3 lbs Glauber's salt crystals per 10 gallons liquor.

Then rinse cold, treat with 3% nitrite of soda and 6% sulphuric acid in a cold bath, rinse again, developing in the case of Jet Black with 0,7% Phenylene Diamine and 2% soda, and of blue-black with 1,2% Beta Naphtol dissolved with equal weights of caustic soda lye of 77° Tw; finally soap hot with the addition of a little New Methylene Blue N.

c) For Blacks produced with Immedial Black.

For dyeing blacks on half-silk materials, our Immedial Black AZ and BZ conc. applied according to our patented process (British Patent No. 24697/01) have proved particularly well adapted. They dye a shade in no way inferior to Aniline Oxidation Black, the production moreover being very much larger in the case of our products, besides which the latter do not affect the fibre nor turn bronzy or greenish on storing.

Dye in 30—40 times the quantity of liquor calculated on the weight of the goods charging the bath with

$2^1/_2$ lbs Immedial Black AZ or
$1^1/_2$ lbs Immedial Black BZ conc.
$1^1/_2$ lbs sodium sulphide crystals
3—4 lbs glucose
3 oz soda ash
3 oz Turkey-red oil
$^1/_2$—1 lb Glauber's salt desiccated

} per 10 gallons liquor.

Boil all the ingredients up together for 5—10 minutes, enter the goods, and dye for 1—$1^1/_2$ hours; then squeeze off lightly, and rinse immediately in a cold bath to which a little soda has been added, and rinse again in warm water. Then treat the goods for about $^3/_4$ hour in a boiling hot bath with 3% bichrome, 2% lactic acid and 5% acetic acid, rinse, and dye boiling hot with logwood extract, in a fatty soap bath, adding if necessary a little fustic extract. For shading, either *Diamine Colours* such as Diamine Yellow CP, Oxy Diamine Orange R, Cotton Brown N, Diamine Green CL, etc. or *Basic Colours* such as New Methylene Blue N, 3R, Safranine S No. 150, Tannin Heliotrope, Solid Green crystals are used. The goods are then dried without again rinsing.

For dyeing subsequent lots in a standing bath, the following quantities are required:

14—18% Immedial Black AZ or
8—10% Immedial Black BZ conc.
8—10% sodium sulphide crystals
8—10% glucose
0,5% soda ash
1% Turkey-red oil
5% Glauber's salt crystals

} of the weight of the goods to be dyed.

Ribbons are best dyed on bent iron rods wrapped round with cloth, being turned about every 10 minutes by means of a broaching stick. Piece-goods are passed into the liquor and turned every 10 or 15 minutes; the goods should always be kept well immersed in the liquor.

The brand Immedial Black AZ is suitable for bluish blacks and BZ conc. for jet blacks.

Directions for Dyeing Two-coloured Half-Silk Materials with Immedial Colours.

For producing the well-known black and white (Grisaille) style the following method (British Patent No. 14581/02) is largely applied.

Charge the dyebath in an ordinary wooden vat, provided with a moveable winch which is fixed not too high above the vat, with

1—2 lbs Immedial Black NF
1—2 lbs sodium sulphide crystals
2—4 lbs glue
8 oz soda ash
2 lbs Glauber's salt crystals

} per 10 gallons liquor.

Dye the previously *mercerised* goods for $^3/_4$—1 hour at 30—40° C. (85—105 deg. F.), turning them occasionally and keeping them otherwise well immersed in the liquor. Then press off lightly, and rinse in cold water charged with a little soda, soaping hot if necessary, and brighten with the addition of 8 oz acetate or formate of soda per 10 gallons liquor.

For dyeing subsequent lots, about

10% Immedial Black NF
10% sodium sulphide crystals
5% glue
1% soda ash

} of the weight of the goods

are required. If the baths have been left standing unused for some time it is necessary in the first place to add a little sodium sulphide (4—8 oz per 10 gallons), boiling up well afterwards and allowing to cool again before adding the afore-mentioned quantities of dyestuff and salt.

The mercerising is best done with the goods full-width with as cold caustic soda lye as possible of 32—40° Tw., whereupon they are immediately rinsed in cold water or neutralised with acid.

If there are no suitable arrangements for the purpose, the mercerising may be carried out without tentering, by first boiling the goods, working for about ten minutes in a cold caustic soda lye of 18—20 Tw., rinsing *immediately* in a cold bath, and neutralising finally. The material will hardly shrink in the least by such treatment.

The following brands may also be used in addition to Immedial Black NF:

Immedial Black NG, NR, NRT, NN conc.,
NLN conc., NNG conc., NNR conc.
Immedial Carbon B, R, JHJ.

Colours are produced in the same way as blacks; they are likewise dyed to advantage on mercerised material, the following dyestuffs being used:

Immedial Brown B, *BR, W conc., RR
Immedial Dark Brown A
Immedial Dark Brown D conc.
*Immedial Cutch O, G, R, BG, BGG
*Immedial Maroon B conc.
*Immedial Bordeaux G conc.
Immedial Bronze A
*Immedial Orange C
Immedial Prune S
Immedial Yellow Olive G
*Immedial Yellow D
Immedial Dark Green B
Immedial Olive B, 3G
Immedial Indogene B conc.
Immedial Direct Blue B, R, OD.

Those marked with an asterisk (*) tint the silk slightly and are therefore best suited for coloured silk effects. The subsequent dyeing with Acid Colours is carried out according to the directions on page 232.

CHEMICALS.
THERMOMETER and HYDROMETER TABLES.
WEIGHTS and MEASURES.
INDEX.

Sulphuric Acid.

Specific Gravity at 15° C (59 deg. F.) (Lunge and Isler).

Degrees Twaddle	Per cent sulphuric acid	Degrees Twaddle	Per cent sulphuric acid	Degrees Twaddle	Per cent sulphuric acid	Degrees Twaddle	Per cent sulphuric acid
2	1.57	48	32.28	94	56.90	140	77.17
4	3.03	50	33.43	96	57.83	142	78.04
6	4.49	52	34 57	98	58.74	144	78.92
8	5.96	54	35.71	100	59.70	146	79.80
10	7.37	56	36.87	102	60.65	148	80.68
12	8.77	58	38.03	104	61.59	150	81.56
14	10.19	60	39.19	106	62.53	152	82.44
16	10.90	62	40.35	108	63.43	154	83.32
18	12.99	64	41.50	110	64.26	156	84.50
20	14.35	66	42.66	112	65.08	158	85.70
22	15.71	68	43.74	114	65.90	160	86.90
24	17.01	70	44.82	116	66.71	162	88.30
26	18.31	72	45.88	118	67.59	164	90.05
28	19.61	74	46.94	120	68.51	165	91.00
30	20.91	76	48.00	122	69.43	166	92.10
32	22.19	78	49.06	124	70.32	167	93·43
34	23.47	80	50.11	126	71.16	168	95.60
36	24.76	82	51.15	128	71 99	168.3*	97.70
38	26.04	84	52.15	130	72.82	168.1*	98.70
40	27.32	86	53.11	132	73.64	168*	99.20
42	28.58	88	54.07	134	74.51	167.7*	99.95
44	29.84	90	55.03	136	75.42		
46	31.11	92	55.97	138	76.30		

* Sulphuric acid of 97.70% has the highest specific gravity, whilst hat of stronger acid is a little lower.

Hydrochloric Acid.

Specific Gravity at 15° C. (59 deg. F.) (Lunge and Marchlewski).

Degrees Twaddle	Per cent hydro-chloric acid	Degrees Twaddle	Per cent hydro-chloric acid	Degrees Twaddle	Per cent hydro-chloric acid	Degrees Twaddle	Per cent hydro-chloric acid
1	1.15	11	11.18	21	20.97	31	30.55
2	2.14	12	12.19	22	21.92	32	31.52
3	3.12	13	13.19	23	22.86	33	32.49
4	4.13	14	14.17	24	23.82	34	33.46
5	5.15	15	15.16	25	24.78	35	34.42
6	6.15	16	16.15	26	25.75	36	35.39
7	7.15	17	17.13	27	26.70	37	36.31
8	8.16	18	18.11	28	27.66	38	37.23
9	9.16	19	19.06	29	28.61	39	38.16
10	10.17	20	20.01	30	29.57	40	39.11

It will be noticed that each degree Twaddle indicates approximately 1% pure hydrochloric acid.

Acetic Acid.

Specific Gravity at 15° C. (59 deg. F.) (Oudemans).

Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle
5	1.3	25	7.0	45	11.4	65	14.3	85	14.8
10	2.8	30	8.2	50	12.3	70	14.7	90	14.3
15	4.3	35	9.4	55	13.1	75	14.9	95	13.2
20	5.7	40	10.5	60	13.7	80	15.0	100	11.1

The specific gravities above 11° Tw. correspond to two liquids of different strengths. To ascertain whether the acid contains more or less than 77 % pure acetic acid, a small quantity of water should be added after measuring; if, on again measuring, a higher specific gravity is found, the acid contains more than 77 %, otherwise less.

Formic Acid.

Specific Gravity at 20° C (68 deg. F.) (Richardson and Allaire).

Perc. by Weight Formic acid	Perc. by Volume Formic acid	Specific Gravity	Perc. by Weight Formic acid	Perc. by Volume Formic acid	Specific Gravity	Perc. by Weight Formic acid	Perc. by Volume Formic acid	Specific Gravity
5	4.14	1.0116	40	35.90	1.0964	75	72.27	1.1170
10	8.40	1.0247	45	40.82	1.1086	80	77.67	1,1861
15	12.80	1.0371	50	45.88	1.1208	85	83.19	1.1954
20	17.17	1.0489	55	51.01	1.1321	90	88 74	1.2045
25	21.73	1.0610	60	56.13	1.1425	95	94.48	1.2141
30	26.37	1.0730	65	61.44	1.1544	100	100	1.2213
35	31.10	1.0848	70	66.80	1.1656			

Oxalic Acid.

Specific Gravity at 15° C. (59 deg. F.) (Franz).

Per cent oxalic acid	Specific Gravity	Per cent oxalic acid	Specific Gravity	Per cent oxalic acid	Specific Gravity
1	1.0032	6	1.0182	10	1.0271
2	1.0064	7	1.0204	11	1.0289
3	1.0096	8	1.0226	12	1.0309
4	1.0128	9	1.0248	12,6	1.0320
5	1.0160				(saturated)

Lactic Acid.

Lactic acid is marketed in the form of a brownish liquor with a peculiar odour. It contains as a rule 50 % of pure lactic acid and has a specific gravity of 1.178. Lactic acid is used mainly as a substitute for tartar for chrome mordants. Its acid salts, marketed as *Lactoline*, are useful for the same purpose. *Antimonine*, an antimony double salt of lactic acid, is used as a substitute for tartar emetic.

Caustic Soda Lye.

Specific Gravity at 15° C. (59 deg. F.) (Lunge).

Per cent Sodium Hydroxide	Degrees Twaddle	Per cent Sodium Hydroxide	Degrees Twaddle	Per cent Sodium Hydroxide	Degrees Twaddle
1	2.4	21	47.2	41	89.4
2	4.6	22	49.4	42	91.5
3	7.0	23	51.6	43	93.6
4	9.2	24	53.8	44	95.6
5	11.8	25	55.8	45	97.6
6	14.0	26	58.0	46	99.8
7	16.2	27	60.0	47	101.6
8	18.4	28	62.0	48	103.8
9	20.6	29	64.2	49	105.8
10	23.0	30	66.4	50	108.0
11	25.2	31	68.6	51	110.0
12	27.4	32	70.2	52	112.0
13	29.6	33	72.6	53	114.0
14	31.8	34	74.8	54	116.0
15	34.0	35	76.8	55	118.2
16	36.2	36	79.0	56	120.2
17	38.4	37	81.0	57	122.2
18	40 4	38	83.0	58	124.4
19	42.6	39	85.2	59	126.6
20	45.0	40	87.4	60	128.6

Ammonia Liquor.

Specific Gravity at 15° C. (59 deg. F). (Lunge and Wiernik).

Specific gravity at 59° F.	Per cent (gaseous) ammonia	Specific gravity at 59° F.	Per cent (gaseous) ammonia	Specific gravity at 59° F.	Per cent (gaseous) ammonia
1.000	0.00	0.960	9.91	0.920	21.75
0.995	1.15	0.955	11 34	0.915	23.36
0.990	2.31	0.950	12.74	0.910	24.99
0.985	3.55	0.945	14.22	0.905	26.65
0.980	4.80	0.940	15.63	0.900	28.33
0.975	6.05	0.935	17.12	0.895	30.03
0.970	7.31	0.930	18.64	0.890	31.75
0.965	8.59	0.925	20.18	0.885	33.68

Sodium Sulphide.

Sodium sulphide is marketed in two qualities, viz, as *crystallised* and as *concentrated* sodium sulphide. Crystallised sodium sulphide consists of brownish crystals containing water of crystallisation and 32 1/2 per cent pure sodium sulphide. The concentrated product has usually double the strength, and is sold in the form of grey or greyish black, irregular lumps.

Sodium sulphide is very freely soluble in cold or warm water. It absorbs from the air moisture, carbon dioxide and oxygen, liquefies and becomes partially converted into carbonate and sulphate of soda. As it thereby loses correspondingly in strength, it should be stored if possible in well closed receptacles and not be kept in stock too long.

Soda.

Specific Gravity of Soda Solution at 15° C. (59 deg. F.) (Lunge)

Degrees Twaddle	Per cent Sodium Carbonate	Degrees Twaddle	Per cent Sodium Carbonate	Degrees Twaddle	Per cent Sodium Carbonate
1	0.47	11	5.23	21	9.90
2	0.95	12	5.71	22	10.37
3	1.42	13	6.17	23	10.83
4	1.90	14	6.64	24	11.30
5	2.38	15	7.10	25	11.76
6	2.85	16	7.57	26	12.23
7	3.33	17	8.04	27	12.70
8	3.80	18	8.51	28	13.16
9	4.28	19	8.97	29	13.63
10	4.76	20	9.43	30	14.09

Soda dissolves in water best at a temperature of 32,5 C. (90 1/2 deg. F.) 100 parts of water dissolve the following quantities of pure sodium carbonate at:

32	41	50	59	68	86	90 1/2	93 and 174	212	deg. F.
7.1	9.5	12.6	16.5	21.4	38.1	59	46.2	45.1	parts soda.

Soda ash is marketed in various degrees of strength, calculated on the supposed percentages of sodium oxide; the chief brands show 48°, 52—56° and 58°, each degree indicating 1 per cent of sodium oxide, 58° consequently corresponding to about 99 per cent of pure sodium carbonate. The usual qualities of 56—58° are pure enough for all dyeing purposes.

Our observations on *soda ash* have reference to the good qualities, irrespective of the process by which they are produced. 100 parts of good soda ash are approximately equivalent to 270 parts soda crystals.

Common Salt.

Specific Gravity of Aqueous Solutions at 15° C. (59 deg. F.). (Gerlach).

Per cent common salt	5	10	15	20	25	26,4 saturated.
Specific gravity	1.0362	1.0733	1.1114	1.1510	1.1932	1.2043
Degrees Twaddle	7.2	14.7	22.3	30.2	38.5	40.9

The solubility of common salt is nearly the same at all temperatures and varies only between 35,5 parts common salt at 0° C. (32 deg. F.) up to 39,2 parts at 100° C. (212 deg. F.) in 100 parts of water.

Since the coarser qualities of common salt which are used for dyeing frequently contain small percentages of calcium sulphate, it is more advantageous to use crystallised Glauber's salt for machine-dyeing, but in almost all other cases common salt may be used instead of crystallised or calcined Glauber's salt.

Glauber's Salt.

Specific Gravity of Aqueous Solutions at 15° C. (59 deg. F.)

Per cent calc. Glauber's salt	Specific Gravity	Per cent calc. Glauber's salt	Specific Gravity	Per cent calc. Glauber's salt	Specific Gravity
1	1.0091	5	1.0457	9	1.0832
2	1.0182	6	1.0550	10	1.0927
3	1.0274	7	1.0644	11	1.1025
4	1.0365	8	1.0737	12	1.1117 saturated

The percentages of crystallised Glauber's salt are found by multiplying the above percentages by $2^1/_4$.

100 parts of calcined Glauber's salt are equivalent to 220 parts of crystallised Glauber's salt.

100 parts of water dissolve at:

32°	50°	59°	68°	77°	86°	91½°	104°	217½° F.
5	9	13	19	28	40	50	49	42.6 parts of calcined Glauber's salt.

Sodium Bisulphate or Bisulphate of Soda.

A white crystalline mass dissolving very easily in water. The diluted aqueous solution decomposes into neutral sodium sulphate (Glauber's salt) and free sulphuric acid, and for this reason bisulphate of soda is used in wool dyeing instead of free sulphuric acid as a mild agent for gradually acidulating the dye liquor. 10 parts of bisulphate of soda are practically equivalent to a mixture of 4 parts sulphuric acid and 10 parts Glauber's salt crystals.

Sodium Bisulphite or Bisulphite of Soda.

Specific weight of the solutions of Sodium Bisulphite at 15° C. (59 deg. F.)

Specific Gravity	% Sodium Bisulphite	Specific Gravity	% Sodium Bisulphite	Specific Gravity	% Sodium Bisulphite	Specific Gravity	% Sodium Bisulphite
1.008	1.6	1.084	8.0	1.171	16.5	1.275	28.9
1.022	2.1	1.100	9.5	1.190	18.5	1.298	31.7
1.038	3.6	1.116	11.2	1.210	20.9	1.321	34.7
1.052	5.1	1.134	12.8	1.230	23.5	1.345	38.0
1.068	6.5	1.152	14.6	1.252	25.9		

Sodium Hydrosulphite or Hydrosulphite of Soda.

Sodium hydrosulphite is an easily soluble white powder, in which form it is very stable, but its aqueous solution, prepared by the action of zinc dust or clippings on bisulphite, oxidises very rapidly and should therefore be protected as well as possible from the action of the air, by being kept in barrels or bottles well filled and tightly closed, but even when kept in this way it decomposes pretty quickly.

Hydrosulphite is chiefly used for preparing the Indigo-hydrosulphite vat and sometimes for stripping coloured materials, and for such purposes is prepared by pouring a mixture of 1 gallon bisulphite of 64° Tw. and 1 gallon cold water over 1 lb zinc dust, stirring well for a short time, allowing the precipitate to settle, and using the clear or the filtered liquor. For stripping, 1—1 1/2 gallon hydrosulphite and 1 pint acetic acid are added to 25 gallons water before entering the material. The material is entered, the bath heated to 50—60° C. (120—140 deg. F.), and the material worked for about 1/4—1/2 hour until the dye is sufficiently stripped off the material. In this way many colours may be destroyed or at least considerably reduced in depth.

Sodium Nitrite (Nitrite) or Nitrite of Soda.

Sodium nitrite forms small crystals readily soluble, but not deliquescent and containing 95—98 % nitrite.

It is used in cotton dyeing for diazotising dyestuffs which are to be developed, and also for diazotising Paranitraniline. Its action is based on the liberation of nitrous acid on the addition of mineral acids, such as hydrochloric acid; acetic acid has not the same effect. For 1 part of nitrite, 3 parts of hydrochloric acid or 2 parts of sulphuric acid are used.

Sodium Acetate or Acetate of Soda.

This salt forms very readily soluble crystals. It serves for neutralising free mineral acids, forming their salts and liberating free acetic acid. For union goods which have been cross-dyed in an acid bath, a final impregnation with acetate of soda is very useful for preserving the strength of the cotton fibre, and an addition of acetate of soda to the last bath used for rinsing cotton goods dyed with Immedial Black is always advisable.

Sodium Formate or Formate of Soda.

This product possesses similar properties and is used for the same purposes as acetate of soda.

Sodium Phosphate or Phosphate of Soda.

This salt forms crystals which effloresce in the air and are soluble in 25 times their weight of cold water, or in their own weight of boiling water. Phosphate of soda is a mild alkaline salt sometimes used in place of Glauber's salt for dyeing Diamine Colours in light shades.

Borax, Sodium Bi-borate or Bi-borate of Soda.

White crystals with water of crystallisation, or white powder when anhydrous, soluble in 20 times its weight of cold water, or half its weight of boiling water. Feebly alkaline salt, sometimes used in place of soda phosphate of soda etc. It is applied also in order to render the bath slightly alkaline without harm to the wool, particularly when dyeing Alkaline Blue. It is further also used for rendering cotton goods incombustible.

Tartar. Potassium Bitartrate. Cream of Tartar. Argol.

Tartar is the acid potassium salt of tartaric acid and is used as an assistant in mordanting with bichrome. It is very sparingly soluble in cold water and even at 100° C (212 deg. F.) 100 parts water dissolve only 6.9 parts tartar.

For some time past lactic acid, lactoline (see page 239), formic acid, oxalic acid and other products have been used with much success in the place of tartar.

Ammonium Acetate or Acetate of Ammonia.

Crystals which are exceedingly soluble in water, but not deliquescent in the air. The solution of the salt smells of ammonia, and red litmus paper is thereby turned faintly blue. The solution is found in commerce and may be easily prepared by mixing

10 oz ammonia (0,913 sp. g. or 24%) and
28¼ oz acetic acid (8° Tw. or 30%)

The solution should not materially change either blue or red litmus paper.

Acetate of ammonia serves for mildly acidulating the dyebaths of Diamine Colours, Alphanol Blue, etc, and for stripping colours off wool and silk.

Ammonium Oxalate or Oxalate of Ammonia.

Ammonium oxalate is a well crystallised salt which readily dissolves at 15° C (59 deg. F.) in 24 times its weight of water. The solution of the salt may be prepared by dissolving

1 lb oxalic acid in
1 gallon hot water and neutralising the solution with about
1 1/3 lbs ammonia (0.913 sp. g. or 24%);

the solution should not change either blue or red litmus paper, and contains about 1 1/8 lb oxalate of ammonia (cryst).

This salt is principally employed when dyeing some Chrome Colours in order to precipitate the lime salts dissolved in hard water and thus render them harmless.

Ammonium Sulphocyanide or Thiocyanate.

This salt forms colourless, very freely soluble crystals. It is chiefly applied in wool dyeing in order to diminish the action of metallic copper on some dyestuffs, as it forms a protective coating of cuprous sulphocyanide on the metal. Care should therefore be taken not to remove this coating by bright-polishing the metal when cleaning the vessels.

Alum.

Commercial alum is sold either as potash alum or as ammonia alum, which show hardly any practical difference in their properties.

100 parts of water dissolve at:

50°	68°	86°	104°	158°	212° F.	
9.5	15.1	22.0	30.9	90.7	357.5	parts potash alum
9.1	13.6	19.3	27.3	72.0	421.9	parts ammonia alum.

Aluminium Sulphate or Sulphate of Alumina.

Sulphate of alumina has the same properties as alum, dissolving however very easily in water and being much stronger, 100 parts of sulphate of alumina being approximately equivalent to 140—150 parts alum: sulphate of alumina sometimes contains an excess of sulphuric acid and small amounts of iron and Glauber's salt. It usually contains 50% pure aluminium sulphate, sometimes even more than 55 per cent.

Aluminium Acetate or Acetate of Alumina.

Acetate of alumina is known in solution only, and is usually prepared by mixing solutions of aluminium sulphate and acetate of lead (sugar of lead) or acetate of lime; for 100 lbs of aluminium sulphate, 171 lbs sugar of lead are used; the two solutions are mixed, and after the precipitate has settled, the clear solution is drawn off for use. In order to free the solution completely from lead, a small quantity of Glauber's salt in solution may be added subsequently. It is used as a mordant and for waterproofing purposes.

Chrome Alum.

Dark crystals which may contain a great many impurities in spite of their beautiful crystalline form. One part of chrome alum dissolves in 7 parts of cold or 2 parts of boiling water. Chrome alum is used for aftertreating Diamine and Immedial Colours.

Chromium Fluoride or Fluor Chrome.

Chromium fluoride is a green crystalline powder which is readily soluble in both cold and hot water, and which is used for aftertreating Diamine Colours, Anthracene Yellow GG, etc.

Bichrome or Chrome. Potassium Bichromate. Red Chromate or Bichromate of Potash.

Bichrome forms large yellowish red crystals which are stable when exposed to air and which do not contain any water of crystallisation.

100 parts of water dissolve at:

32°	50°	104°	176°	212° F.
5	8.5	2.94	73	102 parts bichrome.

Sodium Bichromate or Bichromate of Soda.

Sodium bichromate, contrary to potassium bichromate, forms deliquescent crystals containing water of crystallisation, and is more easily soluble and cheaper than the potassium salt.

It is usually marketed in a strength equal to that of bichromate of potash but not always of the same purity.

100 parts of water dissolve at:

32°	59°	86°	176°	212° F.
107	109	127	143	163 sodium bichromate.

Copperas or Green Vitriol. Sulphate of Iron (Ferrous).

Dissolves easily in water, but oxidises quickly on exposure to the air with separation of red ferric hydroxide.

Pyrolignite of Iron. Iron Liquor or Black Liquor.

This is a dark olive brown liquid with a peculiar smell. The commercial product has usually the specific gravity of 20—30° Tw.

Nitrate of Iron. Ferric Sulphate.

Nitrate of iron derives its name from its being prepared by the oxidation of sulphate of iron by means of nitric acid. It is however not a nitrate but a sulphate, and is marketed as an aqueous solution of about 77° Tw.

Bluestone or Blue Vitriol. Copper Sulphate or Cupric Sulphate.

100 parts of water dissolve at:

50°	68°	86°	122°	158°	194°	212°	
37	42	49	66	95	156	203	parts bluestone.

In using bluestone for aftertreatment, care must be taken that the baths do not become turbid, which is easily prevented by the addition of some acetic acid.

Tartar Emetic.

Tartar emetic, the double tartrate of antimony and potassium, is a crystalline salt which is not very soluble in cold water but more so in hot water.

One part of tartar emetic requires for dissolving at:

47°	70°	88°	122°	167° F.
19	12.6	8.2	5.5	3.2 parts of water.

Specific gravity of aqueous solutions of tartar emetic at 17½° C. (64 deg. F.) (Streit.)

% Tartar Emetic	Specific Gravity	% Tartar Emetic	Specific Gravity
1	1.007	4	1.027
2	1.012	5	1.035
3	1.018	6	1.044

Substitutes for tartar emetic: see Vol. I, page 26, foot note.

Tannin.

Specific gravity of aqueous solutions at 15° C. (59 deg. F.). (Trammer).

Per cent Tannin	Specific Gravity	Per cent Tannin	Specific Gravity
1.0	1.0040	3.5	1.0140
1.5	1.0060	4.0	1.0160
2.0	1.0080	4.5	1.0180
2.5	1.0100	5.0	1.0200
3.0	1.0120		

Sumac.

Good qualities have an olive-green colour and a pleasant smell; they contain 15—20% and sometimes over 25% tannin. Sumacs, which are dull in colour and have a musty smell, have deteriorated by moisture and prolonged storing.

Sumac extract is sold as a thick, dark brown liquid of about 52° Tw., or in a solid state. Decolourised sumac extracts may as a rule replace the tannic acid even for light shades.

Liquid sumac extract is rather apt to ferment, losing thereby in strength.

Peroxide of Hydrogen or Hydrogen Peroxide.

Hydrogen peroxide is used as a colourless aqueous solution prepared by decomposing barium peroxide, or sometimes sodium peroxide with dilute sulphuric acid. The bleaching action of hydrogen peroxide is based on its property of readily developing oxygen, and it is therefore used as a bleaching agent. The strength of the commercial solution is usually expressed in volumes of oxygen evolved by 1 volume of the liquid, the usual strength of 12 volumes corresponding to 3% hydrogen peroxide.

The product keeps best at a low temperature in a dark place and if acidulated with small quantities of acid. An addition of 1½ oz naphtalene or 1 pint of alcohol or ether to 10 gallons of the solution improves its stability. It readily gives off the oxygen in the presence of alkalies or on heating. Some metals also exert a decomposing action on hydrogen peroxide, and it is therefore best kept in well tarred casks or in carboys.

Hydrogen peroxide serves for bleaching white yarns and tissues.

Peroxide of Sodium or Sodium Peroxide

is a white powder, deliquescent in the air and attracting carbon dioxide with development of oxygen. It dissolves in water with generation of heat and on boiling develops oxygen. On sufficient cooling it dissolves in acidulated water with formation of hydrogen peroxide and the corresponding sodium salt. It is therefore frequently employed in place of the latter for bleaching. In contact with inflammable substances it ignites them and should therefore a be handled with care.

Sodium peroxide develops 20 per cent by weight of oxygen whereas hydrogen peroxide of 12 per cent by volume only yields 1⅓ per cent by weight of oxygen. In addition sodium peroxide possesses the advantage of being indefinitely stable when stored well.

Sodium peroxide serves for bleaching in the same way as hydrogen peroxide.

Permanganate of Potash.

Purple, well-nigh black crystals which dissolve only slightly in cold, but very easily in hot, water.

Permanganate of potash has an oxidising effect in acid, neutral, or alkaline solution, and for this reason is applied for the bleaching or decolourising of wool and unions. The brown precipitate which forms on the goods dissolves very easily in a cold dilute solution of bisulphite.

Bleaching Powder or Chloride of Lime. Calcium Hypochlorite.

Specific gravity at 15° C. (59 deg. F.) of aqueous solutions freshly prepared from good chloride of lime.

Degrees Twaddle	Active Chlorine	Degrees Twaddle	Active Chlorine	Degrees Twaddle	Active Chlorine
	grms per litre		grms per litre		grms per litre
1/2	1.40	8	23.75	16	49.96
1	2.71	9	26.62	17	52.27
2	5.58	10	29.60	18	55.18
3	8.48	11	32.68	19	58.40
4	11.41	12	35.81	20	61.50
5	14.47	13	39.10	21	64.50
6	17.36	14	42.31	22	68.00
7	20.44	15	45.70	23	71.50

Chloride of lime is a white powder smelling of chlorine which becomes moist on exposure to air, absorbs carbon dioxide and forms then a doughy mass. Good bleaching powder contains 35-39% active chlorine.

For preparing a solution of chloride of lime, 1 part of bleaching powder is mixed to a paste with 3 parts of water and diluted with 3 parts more water; after settling, the clear solution is diluted to the desired strength. Only clear solutions, free from any lumps, should be used for bleaching purposes. After having been treated with chloride of lime, the goods must always be rinsed thoroughly.

Hypochlorite and bleaching solutions (containing such) are tested in exactly the same manner as chloride of lime.

The following method of testing the hypochlorite liquors in the bleach house has been proposed by R. Baur: For the titration of the bleaching liquors in use a "thiosulphate" burette graduated into 1/5 c.c. and a "chlorine tube" are required. The latter is a glass tube of about 1 1/2 cm (3/5 inch) inside width and 50 cm (20 inches) length which is closed at one end. The chemicals used for the test are hydrochloric acid, potassium iodide and a thiosulphate solution containing 6.95 grms sodium thiosulphate in 1 litre water. This solution, each c.c. of which corresponds to 1 mg (0.001 grm) of active chlorine, is filled into the "thiosulphate burette". The "chlorine tube" is filled with 10 c.c. of the old chlorine liquor from the bleach house, and a few c. c. of a solution of potassium iodide are added until, on gently shaking, the liquor does not become browner or more turbid. When this point has been reached, a few c.c. of hydrochloric acid are added, until the turbid liquor has become quite clear (brown). The thiosulphate solution is now added, pretty quickly at first and then drop by drop, until the colour, which on moderate shaking had at first become paler and yellow, turns suddenly into a watery blue. Each c.c. of thiosulphate solution added indicates 1 mg (0.001 grm) of active chlorine in 10 c.c. of bleaching liquor.

Sodium Hypochlorite. Hypochlorite of Soda. Eau de Javelle.

Sodium hypochlorite is known only in the form of its aqueous solution, which is produced either by the electrolysis of common salt or by mixing the solutions of chloride of lime and of soda.

100 lbs of chloride of lime 33% are mixed with 40 gallons of water, and 60 lbs of soda ash are dissolved in 20 gallons of boiling water and diluted with 10 gallons of cold water. The soda solution is added to the paste of chloride of lime and the mixture stirred for 1/2 hour and allowed to settle overnight. The clear solution is drawn off and the precipitate washed 4 or 5 times with cold water, the wash water being used to dilute the solution to 150 gallons of 6—7° Tw. It may be entirely freed from lime by the addition of 1—2 lbs soda ash, which precipitates the remaining lime. The solution reacts somewhat alkaline.

Hyraldite.

Hyraldite is the stable formaldehyde compound of hydrosulphite and serves for discharging and also for the stripping of dyeings.

It is marketed in the following brands:

Hyraldite A
Hyraldite C extra
Hyraldite C special
Hyraldite W
Hyraldite CW extra
Hyraldite Z for Stripping.

Hyraldite A, C extra W and C special are easily soluble in water; the "W" brands are partially soluble. Hyraldite Z for Stripping is insoluble in water and exceedingly stable.

Hyraldite must be stored in closed vessels and in a cool place.

Hyraldite A and the double strength brand *Hyraldite C extra* may be used for discharging and for stripping;

Hyraldite Z for Stripping, as the name implies, is specially well suited for stripping purposes. The other brands serve for discharging only.

For particulars regarding the discharging see Volume IV.

For stripping purposes charge a bath of 40—50° C. (105—120 deg. F.) with

2—4 % Hyraldite Z for Stripping
2,5—5,5% formic acid 85% or
1,5—2,5% sulphuric acid
} of the weight of the goods;

or,

5—10% Hyraldite A or
2,5—5 % Hyraldite C extra and
5—10% acetic acid 8 deg. Tw. or bisulphite 64 deg. Tw.
} of the weight of the goods.

Enter the goods, raise gradually to the boil in 1/2—3/4 hour, and boil for 20—30 minutes, then rinse thoroughly, neutralise if necessary, and rinse again.

Comparison of the Thermometer Tables of Celsius or Centigrade, Fahrenheit and Réaumur.

Degrees			Degrees			Degrees		
Celsius	Fahrenheit	Réaumur	Celsius	Fahrenheit	Réaumur	Celsius	Fahrenheit	Réaumur
0	32.0	0.0	34	93,2	27.2	68	154.4	54.4
1	33.8	0.8	35	95.0	28.0	69	156.2	55.2
2	35.6	1.6	36	96.8	28.8	70	158.0	56.0
3	37.4	2.4	37	98.6	29.6	71	159.8	56.8
4	39.2	3.2	38	100.4	30.4	72	161.6	57.6
5	41.0	4.0	39	102.2	31.2	73	163.4	58.4
6	42.8	4.8	40	104.0	32.0	74	165.2	59.2
7	44.6	5.6	41	105.8	32.8	75	167.0	60.0
8	46.4	6.4	42	107.6	33.6	76	168.8	60.8
9	48.2	7.2	43	109.4	34.4	77	170.6	61.6
10	50.0	8.0	44	111.2	35.2	78	172.4	62.4
11	51.8	8.8	45	113.0	36.0	79	174.2	63.2
12	53.6	9.6	46	114.8	36.8	80	176.0	64.0
13	55.4	10.4	47	116.6	37.6	81	177.8	64.8
14	57.2	11.2	48	118.4	38.4	82	179.6	65.6
15	59.0	12.0	49	120.2	39.2	83	181.4	66.4
16	60.8	12.8	50	122.0	40.0	84	183.2	67.2
17	62.6	13.6	51	123.8	40.8	85	185.0	68.0
18	64.4	14.4	52	125.6	41.6	86	186.8	68.8
19	66.2	15,2	53	127.4	42.4	87	188.6	69.6
20	68.0	16.0	54	129.2	43.2	88	190.4	70.4
21	69.8	16.8	55	131.0	44.0	89	192.2	71.2
22	71.6	17.6	56	132.8	44.8	90	194.0	72.0
23	73.4	18.4	57	134.6	45.6	91	195.8	72.8
24	75.2	19.2	58	136.4	46.4	92	197.6	73.6
25	77.0	20.0	59	138.2	47.2	93	199,4	74.4
26	78.8	20.8	60	140.0	48.0	94	201,2	75.2
27	80.6	21.6	61	141.8	48.8	95	203,0	76.0
28	82,4	22.4	62	143.6	49.6	96	204,8	76.8
29	84.2	23.2	63	145.4	50.4	97	206.6	77.6
30	86.0	24.0	64	147.2	51.2	98	208,4	78.4
31	87.8	24.8	65	149.0	52.0	99	210.2	79.2
32	89.6	25.6	66	150.8	52.8	100	212.0	80.0
33	91.4	26.4	67	152.6	53.6			

Comparison of Hydrometer Degrees Twaddle and Baumé with the Specific Gravities for Liquids heavier than Water.

Degrees Twaddle	Degrees Baumé	Spec. Gravity	Degrees Twaddle	Degrees Baumé	Spec. Gravity	Degrees Twaddle	Degrees Baumé	Spec. Gravity
1	0.7	1.005	58	32.4	1.290	116	53.0	1.580
2	1.4	1.010	60	33.3	1.300	118	53.6	1.590
4	2.7	1.020	62	34.2	1.310	120	54.1	1.600
6	4.1	1.030	64	35.0	1.320	122	54.7	1.610
8	5.4	1.040	66	35.8	1.330	124	55.2	1.620
10	6.7	1.050	68	36.6	1.340	126	55.8	1.630
12	8.0	1.060	70	37.4	1.350	128	56.3	1.640
14	9.4	1.070	72	38.2	1.360	130	56.9	1.650
16	10.6	1.080	74	39.0	1.370	132	57.4	1.660
18	11.9	1.090	76	39.8	1.380	134	57.9	1.670
20	13.0	1.100	78	40.5	1.390	136	58.4	1.680
22	14.2	1.110	80	41.2	1.400	138	58.9	1.690
24	15.4	1.120	82	42.0	1.410	140	59.5	1.700
26	16.5	1.130	84	42.7	1.420	142	59.9	1.710
28	17.7	1.140	86	43.4	1.430	144	60.4	1.720
30	18.8	1.150	88	44.1	1.440	146	60.9	1.730
32	19.8	1.160	90	44.8	1.450	148	61.4	1.740
34	20.9	1.170	92	45.4	1.460	150	61.8	1.750
36	22.0	1.180	94	46.1	1.470	152	62.3	1.760
38	23.0	1.190	96	46.8	1.480	154	62.8	1.770
40	24.0	1.200	98	47.4	1.490	156	63.2	1.780
42	25.0	1.210	100	48.1	1.500	158	63.7	1.790
44	26.0	1.220	102	48.7	1.510	160	64.2	1.800
46	26.9	1.230	104	49.4	1.520	162	64.6	1.810
48	27.9	1.240	106	50.0	1.530	164	65.0	1.820
50	28.8	1.250	108	50.6	1.540	166	65.5	1.830
52	29.7	1.260	110	51.2	1.550	168	65.9	1.840
54	30.6	1.270	112	51.8	1.560	169	66.1	1.845
56	31.5	1.280	114	52.4	1.570	170	66.3	1.850

Note:

The degrees in Twaddle's hydrometer bear a direct relationship to the specific gravity and may be obtained from the same by the following formula in which d represents the specific gravity and n the number of degrees Twaddle: $n = \frac{1000\ d - 1000.}{5}$ On the other hand by the formula $d = \frac{5\ n + 1000}{1000}$ the degrees Twaddle are converted into the corresponding specific gravity. For values below 2.0 the degrees Twaddle may also be obtained from the specific gravity

by moving the decimal point two figures to the right, striking off the first figure and multiplying the rest by 2, as per the following example:

Specific gravity 1.133 :
113.3 :
13.3 × 2 :
26.6° Twaddle.

Comparison of Hydrometer Degrees Baumé with the Specific Gravity of Liquids lighter than Water.

Degrees Baumé	Spec. Gravity	Degrees Baumé	Spec. Gravity	Degrees Baumé	Spec. Gravity	Degrees Baumé	Spec. Gravity
11	0.993	16	0.960	21	0.930	26	0.901
12	0.987	17	0.954	22	0.924	27	0.896
13	0.980	18	0.948	23	0.918	28	0.890
14	0.973	19	0.942	24	0.913	29	0.885
15	0.967	20	0.936	25	0.907	30	0.880

Weights and Measures.

I. Metric System.

1 metre (m) = 10 decimetres (dm) = 100 centimetres (cm) = 1000 millimetres (mm).
1 litre (l) = 1000 cubic centimetres (cc or ccm). 1 cubic metre (cbm) = 1000 litres.
1 gramme (g or gr or grm) = 10 decigrammes (dg) = 100 centigrammes (cg) = 1000 milligrammes (mg).
1 kilogramme (kg or kilo) = 1000 grammes.
1000 kilogrammes = 1 ton (t), i. e. metric ton.
100 kilogrammes = 1 metric centner or quintal.
50 kilogrammes = 1 centner (or nearly 1 hundredweight).
10 grammes = 1 dekagramme (deka or Dg). 100 grammes = 1 hectogramme (hg).

The gramme is the standard unit of weight of the metric system and is equal to the weight of 1 cubic centimetre of pure water (measured whilst at its greatest density, in vacuum under a latitude of 45 degrees, at sea level). Hence the following relations of weights and measures are obtained:

1 cubic centimetre water = 1 gramme.
1 litre ,, = 1 kilogramme.
1 cubic metre ,, = 1 ton.

II. English Weights and Measures.

1 yard (yd) = 3 feet. 1 foot (') = 12 inches ("). 1 inch = 12 lines ("').
1 yard = 91.44 centimetres. 1 foot = 30.48 centimetres. 1 inch = 2.54 centimetres.
1 metre = 1.094 yard = 3.281 feet = 39.37 inches.
1 Imperial gallon (gall.) = 4 quarts (qts) = 8 pints (pts) = 32 gills.
1 Imperial gallon = 4.544 litres. 1 litre = 0.220 Imperial gallon.
1 pint = 0.568 litre. 1 litre = 1.76 pints.

In England by the term gallon (gall.) the Imperial gallon is meant, whilst in the United States of America the considerably smaller apothecary's or wine gallon is usually understood by this term. In England the ton or gross ton of 2240 lbs is also exclusively in use, whilst in the United States the term "ton" may refer either to the gross ton of 2240 lbs or the short ton of 2000 lbs avoirdupois. The weights and measures used in this book always refer to the Imperial gallon, and to the gross ton of 2240 lbs.

1 wine gallon = 4 quarts = 8 pints.
1 wine gallon = 3.785 litres. 1 litre = 0.264 wine gallon.
1 pint (apothecary's measure) = 0.473 litre. 1 litre = 2.114 pints (apothecary's measure).
1 Imperial gallon = 1.2 wine gallon. 1 wine gallon = 0.8335 Imperial gallon.
1 pound avoirdupois (lb) = 16 ounces (oz) = 256 drachms (drm).
1 pound avoirdupois = 7000 Troy grains (gr).
1 ton (gross ton) = 20 hundredweights (cwt) = 2240 lbs.
1 hundredweight = 4 quarters (28 lbs each) = 112 lbs.
1 ton = 1016 kilogrammes. 1 pound avoirdupois = 453. 593 grammes.
1 ounce = 28.349 grammes. 1 Troy grain = 0.065 gramme.
1 kilogramme = 2.205 lbs avoirdupois. 1 gramme = 15.434 Troy grains.
1 Imperial gallon holds 10 pounds avoirdupois or 70 000 grains water (measured at 62° F. under a barometric pressure of 30 inches).
1 wine gallon holds only 8.35 lbs water.

III. Russian Weights and Measures.

1 sagèn = 3 arshin = 7 feet.
1 foot = 12 inches. 1 arshin = 16 vershock.
1 foot = 30.48 centimetres. 1 inch = 2.54 centimetres. 1 Russian foot or inch equal to 1 English foot or inch respectively.
1 arshin = 71.12 centimetres. 1 vershock = 4.45 centimetres.
1 metre = 3.28 feet = 39.37 inches = 1.41 arshin = 22.50 vershock.

1 vedro = 8 stof = 12 quart = 30 krushki.
1 vedro = 12.30 litres. 1 stof = 1.54 litre. 1 quart = 1.02 litre.
1 litre = 0.0813 vedro = 0.9756 quart.

1 pood = 40 pounds (Russian). 1 pound = 32 lot = 96 solotnik.
1 pood = 16.38 kilogrammes. 1 kilogramme = 0.06 pood.
1 pound (Russian) = 409.51 grammes. 1 lot = 12.48 grammes.
1 solotnik = 4.16 grammes.
1 kilogramme = 2.44 pounds (Russian).

In Russian Poland the following weights and measures are used:

1 ell = 2 feet = 0.81 arshin = 12.96 vershock.
1 foot = 12 inches = 0.945 Russian foot = 11.34 Russian inches.
1 ell = 57.6 centimetres. 1 foot = 28.8 centimetres.
1 pound = 32 lots = 0.99 Russian pound = 405.50 grammes.
1 centner = 4 stone = 100 pounds = 2.476 pud.

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PERCENTAGE TABLES

THIS table provides the practical dyer with a convenient and exact method of converting percentages of colour into avoirdupois.

The following may serve as an example:

If 60 lbs of material are to be dyed with 1.69% of colour, proceed as follows:

For 10 lbs,	1% equals 1 oz 263 grains		
" 50 "	1% " 8 oz		
For 60 lbs,	1% equals 9 oz 263 grains		9 oz 263 grains
For 10 lbs,	0.69% equals 1 oz 46 grains		
" 50 "	0.69% " 5 oz 228 grains		
For 60 lbs,	0.69% equals 6 oz 274 grains		6 oz 274 grains
	1.69%		15 oz 537 grains
			or **1** lb **99** grains.

PERCENTAGE TABLES

Per Cent	For 10 Lbs	For 50 Lbs	For 100 Lbs
10%	1 lb.	5 lbs.	10 lbs.
9%	14 oz. 175 grains	4½ lbs.	9 lbs.
8%	12 oz. 350 grains	4 lbs.	8 lbs.
7%	11 oz. 87 grains	3½ lbs.	7 lbs.
6%	9 oz. 263 grains	3 lbs.	6 lbs.
5%	8 oz.	2½ lbs.	5 lbs.
4%	6 oz. 175 grains	2 lbs.	4 lbs.
3%	4 oz. 350 grains	1½ lbs.	3 lbs.
2%	3 oz. 88 grains	1 lb	2 lbs.
1%	1 oz. 263 grains	8 oz.	1 lb.
0.99	1 oz. 256 grains	7 oz. 403 grains	15 oz. 368 grains
0.98	1 oz. 249 grains	7 oz. 368 grains	15 oz. 298 grains
0.97	1 oz. 242 grains	7 oz. 333 grains	15 oz. 228 grains
0.96	1 oz. 235 grains	7 oz. 298 grains	15 oz. 158 grains
0.95	1 oz. 228 grains	7 oz. 263 grains	15 oz. 88 grains
0.94	1 oz. 221 grains	7 oz. 228 grains	15 oz. 18 grains
0.93	1 oz. 214 grains	7 oz. 193 grains	14 oz. 385 grains
0.92	1 oz. 207 grains	7 oz. 158 grains	14 oz. 315 grains
0.91	1 oz. 200 grains	7 oz. 123 grains	14 oz. 245 grains
0.90	1 oz. 193 grains	7 oz. 88 grains	14 oz. 175 grains
0.89	1 oz. 186 grains	7 oz. 53 grains	14 oz. 105 grains
0.88	1 oz. 179 grains	7 oz. 18 grains	14 oz. 35 grains
0.87	1 oz. 172 grains	6 oz. 420 grains	13 oz. 403 grains
0.86	1 oz. 165 grains	6 oz. 385 grains	13 oz. 333 grains
0.85	1 oz. 158 grains	6 oz. 350 grains	13 oz. 263 grains
0.84	1 oz. 151 grains	6 oz. 315 grains	13 oz. 193 grains
0.83	1 oz. 144 grains	6 oz. 280 grains	13 oz. 123 grains
0.82	1 oz. 137 grains	6 oz. 245 grains	13 oz. 53 grains
0.81	1 oz. 130 grains	6 oz. 210 grains	12 oz. 420 grains
0.80	1 oz. 123 grains	6 oz. 175 grains	12 oz. 350 grains
0.79	1 oz. 116 grains	6 oz. 140 grains	12 oz. 280 grains
0.78	1 oz. 109 grains	6 oz. 105 grains	12 oz. 210 grains
0.77	1 oz. 102 grains	6 oz. 70 grains	12 oz. 140 grains
0.76	1 oz. 95 grains	6 oz. 35 grains	12 oz. 70 grains
0.75	1 oz. 88 grains	6 oz	12 oz.
0.74	1 oz. 81 grains	5 oz. 403 grains	11 oz. 368 grains
0.73	1 oz. 74 grains	5 oz. 368 grains	11 oz. 298 grains
0.72	1 oz. 67 grains	5 oz. 333 grains	11 oz. 228 grains
0.71	1 oz. 60 grains	5 oz. 298 grains	11 oz. 158 grains
0.70	1 oz. 53 grains	5 oz. 263 grains	11 oz. 88 grains

PERCENTAGE TABLES

Per Cent	For 10 Lbs	For 50 Lbs	For 100 Lbs
0.69	1 oz. 46 grains	5 oz. 228 grains	11 oz. 18 grains
0.68	1 oz. 39 grains	5 oz. 193 grains	10 oz. 385 grains
0.67	1 oz. 32 grains	5 oz. 158 grains	10 oz. 315 grains
0.66	1 oz. 25 grains	5 oz. 123 grains	10 oz. 245 grains
0.65	1 oz. 18 grains	5 oz. 88 grains	10 oz. 175 grains
0.64	1 oz. 11 grains	5 oz. 53 grains	10 oz. 105 grains
0.63	1 oz. 4 grains	5 oz. 18 grains	10 oz. 35 grains
0.62	434 grains	4 oz. 420 grains	9 oz. 403 grains
0.61	427 grains	4 oz. 385 grains	9 oz. 333 grains
0.60	420 grains	4 oz 350 grains	9 oz. 263 grains
0.59	413 grains	4 oz. 315 grains	9 oz. 193 grains
0.58	406 grains	4 oz. 280 grains	9 oz. 123 grains
0.57	399 grains	4 oz. 245 grains	9 oz. 53 grains
0.56	392 grains	4 oz. 210 grains	8 oz. 420 grains
0.55	385 grains	4 oz. 175 grains	8 oz. 350 grains
0.54	378 grains	4 oz. 140 grains	8 oz. 280 grains
0.53	371 grains	4 oz. 105 grains	8 oz. 210 grains
0.52	364 grains	4 oz. 70 grains	8 oz. 140 grains
0.51	357 grains	4 oz. 35 grains	8 oz. 70 grains
0.50	350 grains	4 oz.	8 oz.
0.49	343 grains	3 oz. 403 grains	7 oz. 368 grains
0.48	336 grains	3 oz 368 grains	7 oz. 298 grains
0.47	329 grains	3 oz. 333 grains	7 oz. 228 grains
0.46	322 grains	3 oz. 298 grains	7 oz. 158 grains
0.45	315 grains	3 oz. 263 grains	7 oz. 88 grains
0.44	308 grains	3 oz. 228 grains	7 oz. 18 grains
0.43	301 grains	3 oz. 193 grains	6 oz. 385 grains
0.42	294 grains	3 oz. 158 grains	6 oz. 315 grains
0.41	287 grains	3 oz. 123 grains	6 oz. 245 grains
0.40	280 grains	3 oz 88 grains	6 oz. 175 grains
0.39	273 grains	3 oz. 53 grains	6 oz. 105 grains
0.38	266 grains	3 oz. 18 grains	6 oz. 35 grains
0.37	259 grains	2 oz. 420 grains	5 oz. 403 grains
0.36	252 grains	2 oz. 385 grains	5 oz. 333 grains
0.35	245 grains	2 oz. 350 grains	5 oz 263 grains
0.34	238 grains	2 oz. 315 grains	5 oz. 193 grains
0.33	231 grains	2 oz. 280 grains	5 oz. 123 grains
0.32	224 grains	2 oz. 245 grains	5 oz. 53 grains
0 31	217 grains	2 oz. 210 grains	4 oz. 420 grains
0.30	210 grains	2 oz. 175 grains	4 oz. 350 grains

PERCENTAGE TABLES

Per Cent	For 10 Lbs	For 50 Lbs	For 100 Lbs
0.29	203 grains	2 oz. 140 grains	4 oz. 280 grains
0.28	196 grains	2 oz. 105 grains	4 oz. 210 grains
0.27	189 grains	2 oz. 70 grains	4 oz. 140 grains
0.26	182 grains	2 oz. 35 grains	4 oz. 70 grains
0.25	175 grains	2 oz.	4 oz.
0.24	168 grains	1 oz. 403 grains	3 oz. 368 grains
0.23	161 grains	1 oz. 368 grains	3 oz. 298 grains
0.22	154 grains	1 oz. 333 grains	3 oz. 228 grains
0.21	147 grains	1 oz. 298 grains	3 oz. 158 grains
0.20	140 grains	1 oz. 263 grains	3 oz. 88 grains
0.19	133 grains	1 oz. 228 grains	3 oz. 18 grains
0.18	126 grains	1 oz. 193 grains	2 oz. 385 grains
0.17	119 grains	1 oz. 158 grains	2 oz 315 grains
0.16	112 grains	1 oz. 123 grains	2 oz. 245 grains
0.15	105 grains	1 oz. 88 grains	2 oz 175 grains
0.14	98 grains	1 oz. 53 grains	2 oz. 105 grains
0.13	91 grains	1 oz. 18 grains	2 oz. 35 grains
0.12	84 grains	420 grains	1 oz. 403 grains
0.11	77 grains	385 grains	1 oz. 333 grains
0.10	70 grains	350 grains	1 oz. 263 grains
0.09	63 grains	315 grains	1 oz. 193 grains
0.08	56 grains	280 grains	1 oz. 123 grains
0.07	49 grains	245 grains	1 oz. 53 grains
0.06	42 grains	210 grains	420 grains
0.05	35 grains	175 grains	350 grains
0.04	28 grains	140 grains	280 grains
0.03	21 grains	105 grains	210 grains
0.02	14 grains	70 grains	140 grains
0.01	7 grains	35 grains	70 grains

In giving these weights, we have confined ourselves entirely to pounds, ounces and grains, leaving out drachms and scruples.

We figure:

1 pound = 16 ounces = 7000 grains
1 ounce = 437.5 grains

Very often smaller weights than ounces are not available in a dyehouse, in such a case, United States coins may be used as weights, in the following manner:

10 cent piece (silver) = 39 grains. 5 cent piece (nickel) = 77 grains.
1 cent piece (copper) = 47 grains. 25 cent piece (silver) = 95 grains.
50 cent piece (silver) = 190 grains.

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SPECIALCOLL TP897.C381908v.2
Cassella Color Company, New York. c.2
A manual of dyeing with the dyestuffs of the Cassella

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